A Dissertation on

"TO ASSESS THE EFFICACY OF ANTERIOR APPROACH TO BOTH FEMORAL AND SCIATIC NERVE VIA A SINGLE SKIN SITE INJECTION TECHNIQUE vs CLASSICAL TWO SITE INJECTION TECHNIQUE USING NERVE LOCATOR FOR LOWER LIMB SURGERY"

Submitted to the

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

In partial fulfilment of the requirements

For the award of degree of

M.D. (Branch-X)

ANAESTHESIOLOGY

GOVERNMENT STANLEY MEDICAL COLLEGE & HOSPITAL

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY,

CHENNAI, TAMILNADU

APRIL 2013

CERTIFICATE

This is to certify that this dissertation entitled **"TO ASSESS THE EFFICACY OF ANTERIOR APPROACH TO BOTH FEMORAL AND SCIATIC NERVE VIA A SINGLE SKIN SITE INJECTION TECHNIQUE vs CLASSICAL TWO SITE INJECTION TECHNIQUE USING NERVE LOCATOR FOR LOWER LIMB SURGERY",** Submitted by **DR.GIRISH.B.K** to the faculty of ANAESTHESIOLOGY, The Tamil Nadu Dr. M.G.R. Medical University, Chennai, in partial fulfillment of the requirement in the award of degree of M.D. Degree, Branch - X (ANAESTHESIOLOGY), for the April 2013 examination is a bonafide research work carried out by him during the period of November 2011 to May 2012 at Government Stanley Medical College and Hospital, Chennai under our direct supervision and guidance of **Dr. KUMUDHA LINGARAJ**, Professor, Department of Anaesthesiology at Stanley Medical College, Chennai.

Prof. Dr .KUMUDHA LINGARAJ, M.D., D.A.,
Professor, Guide,
Department of Anaesthesiology,
Stanley Medical College and Hospital,
Chennai – 600 001.

Prof. Dr. P. CHANDRASEKAR, M.D., D.A.,
Professor and H.O.D.
Department of Anaesthesiology
Stanley Medical College
and Hospital, Chennai – 600 001.

Prof . Dr. GEETHA LAKSHMI, M.D, Ph.D
Dean
Government Stanley Medical College,
Chennai – 600001.

CERTIFICATE

This is to certify that the dissertation presented herein by **"TO ASSESS THE EFFICACY OF ANTERIOR APPROACH TO BOTH FEMORAL AND SCIATIC NERVE VIA A SINGLE SKIN SITE INJECTION TECHNIQUE vs CLASSICAL TWO SITE INJECTION TECHNIQUE USING NERVE LOCATOR FOR LOWER LIMB SURGERY", Dr.GIRISH.B.K.,** is an original work done in the Department of Anesthesiology, Government Stanley Medical College and Hospital, Chennai in partial fulfillment of regulations of the Tamilnadu Dr. M.G.R. Medical University for the award of degree of M.D. (Anesthesiology) Branch X, under my supervision during the academic period 2010-2013.

Prof.Dr GEETHA LAKSHMI, M.D.,Ph.D.
Dean
Stanley Medical College,
Chennai – 600 001.

Prof. Dr. P. CHANDRASEKAR, M.D., D.A.,
Professor and H.O.D.
Department of Anaesthesiology
Stanley Medical College
and Hospital, Chennai – 600 001.

DECLARATION

I, **Dr .GIRISH.B.K** , Solemnly declare that the dissertation **"TO ASSESS THE EFFICACY OF ANTERIOR APPROACH TO BOTH FEMORAL AND SCIATIC NERVE VIA A SINGLE SKIN SITE INJECTION TECHNIQUE vs CLASSICAL TWO SITE INJECTION TECHNIQUE USING NERVE LOCATOR FOR LOWER LIMB SURGERY",** is a bonafide work done by me during the period of November 2011 to May 2012 at Government Stanley Medical College and Hospital, under the expert supervision of **Dr.P. CHANDRASEKAR, M.D, D.A.** Professor and Head of Department Of Anaesthesiology, Government Stanley Medical College, Chennai.

This thesis is submitted to The Tamil Nadu Dr .M.G.R. Medical University in partial fulfilment of the rules and regulations for the M.D. degree examinations in Anaesthesiology to be held in April 2013.

Chennai-1 **Dr .GIRISH.B.K.**

Date:

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CONTENTS

INTRODUCTION

Peripheral nerve blocks have been increasingly recognized as the technique of choice for providing anaesthesia and postoperative analgesia. These techniques have evolved as the sole technique for surgery [2, 3] and are also used as a treatment modality in acute and chronic pain management.

There technique avoids the complications of general anaesthesia, also where general anesthesia and other modes of anesthesia cannot be given[12].

The peripheral nerve blockade provides better hemodynamic conditions and also provides good post-operative pain relief [3, 16]. When the sciatic nerve block is combined with femoral nerve block the entire lower extremity can be blocked providing surgical anesthesia and good post operative pain relief. Several techniques are known to block sciatic nerve. The blocks to the lower limb can be performed in different positions. The positions may be supine [2, 3], lateral [13] or prone [23].

Lower extremity operations requires blockade of two nerves and since the change of the patient position will be difficult and painful in trauma or arthritis in old age, the method of block needs to consider the change of position of patient and joint mobility. For surgery below knee in trauma patients, who cannot change the position from supine to prone or lateral position, the anterior approach to both sciatic and femoral nerve is indicated.

Anterior approach is easy to perform in supine position with minimal discomfort to patient especially in case of trauma, as no change of position is required. Single skin needle injection also causes minimal discomfort to patients [7, 9].

My study attempts to evaluate the techniques of combined femoral and sciatic nerve block through anterior approach by using peripheral nerve stimulator.

AIM

To assess the efficacy of combined anterior Approach to both femoral and sciatic nerve via a single skin site injection technique vs. classical two site injection technique using nerve locator for lower limb surgery.

HISTORY

1. **"The doctrine of specific energies of the senses"** – proclaimed by **Johannes P.Mueller** in 1826 stated that it is the nerve that determine what the mind perceives which opened up a new field of scientific thought and research into nerve function.

2. Regional anaesthesia traces its origin to **Dr.Carl Koller,** a young Viennese Ophthalmologist, who in 1884 employed a solution cocaine for topical corneal anaesthesia in patients undergoing eye surgeries.

3. In 1845 on 3rd June **Sir France Rynd** appointed surgeon to Meath hospital delivered morphine solution to a nerve for relieving intractable neuralgia – solution delivered by means of gravity through cannula.

4. 1884 **William Steward Halsted** performed first documented Brachial plexus anesthesia.

5. In 1911 **Hirschel** and **Kulenkompff** performed first percutaneous axillary and supraclavicular Brachial plexus blocks.

6. **Victor pauchet** in 1914 published the textbook for Regional anaesthesia – **'L' Anesthesie regionale"** first book of its kind.

8. **Gaston Labat** in 1922 published the first edition of **"Regional anaesthesia – technique and clinical applications"**.

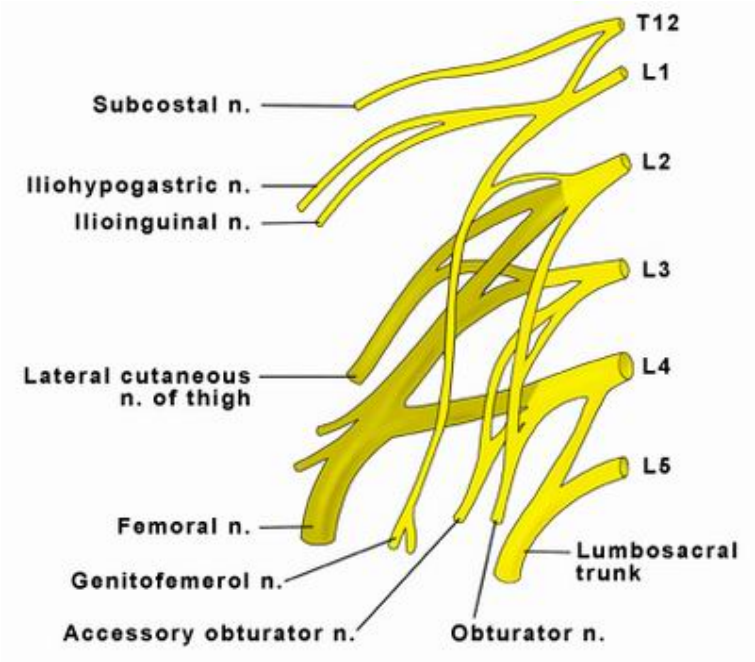
9. In **1923** an American society o f regional anesthesia was found.

10. In 1973 **Montgomery Raj** first used nerve stimulator in clinical practice.

11. **Rosenblatt** was the first to use catheters to provide continuous femoral block for lower surgeries.

ANATOMICAL CONSIDERATIONS

Figure 1: Anatomy of Lumbar plexus

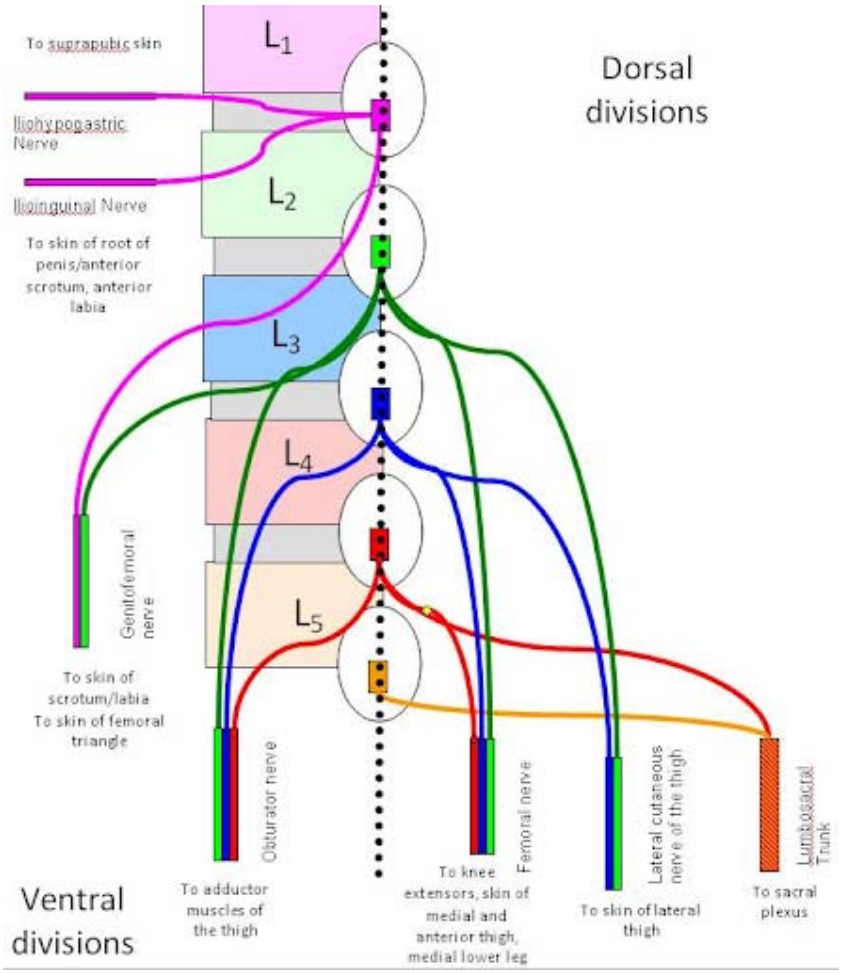


The **lumbar plexus** present in lumbar region is part of Lumbosacral plexus. It is formed by ventral divisions of the first four lumbar nerves (L1 toL4) and from contributions from sub costal (T12).

L_1 is frequently supplemented by T_{12} divides into upper and lower branch. Upper branch gives illioinguinal and illiohypogastric nerves while the Lower branch unites with L_2 to form genitofemoral nerve.

L_2, L_3, L_4 nerves divides into ventral and dorsal division. Ventral division as obturator nerve. Dorsal division as femoral nerve and Lateral cutaneous nerve of thigh.

Figure 2: Lumbar plexus



FEMORAL NERVE

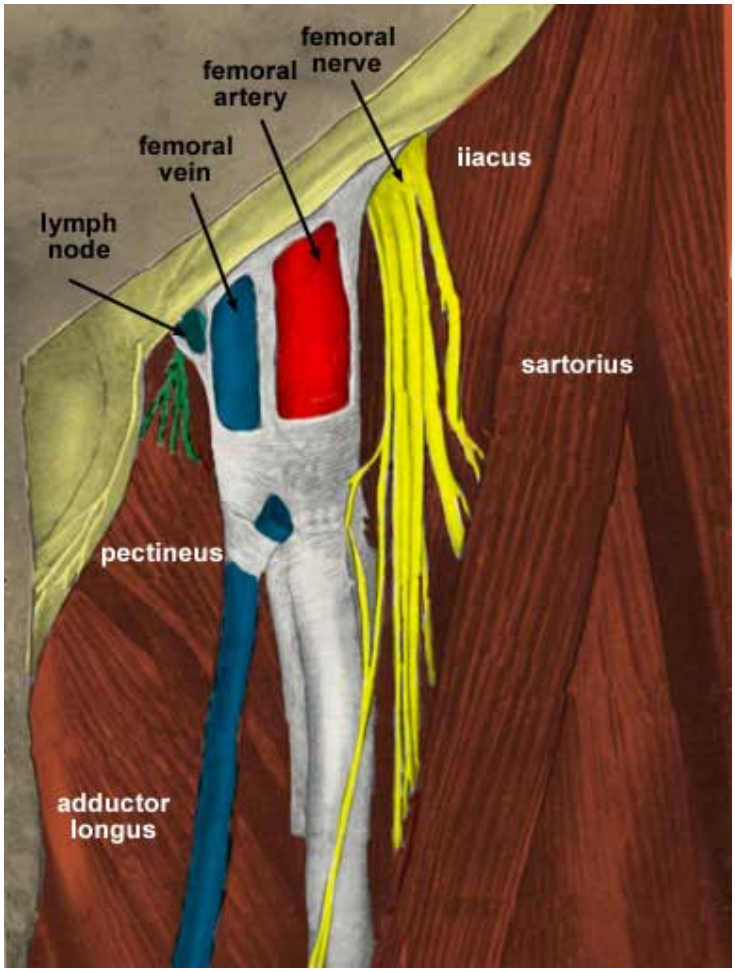


Figure :3 Femoral nerve

Femoral nerve the largest branch of plexus appears at the lateral margin of psoas major muscle and remains in the groove between psoas major and iliacus muscle. At the base of femoral triangle the nerve lies one finger breadth lateral to the femoral artery. In the femoral triangle the nerve divides into anterior and posterior division.

Anterior division gives muscular branches to

1) Pectinius

2) Sartorius

Posterior division gives muscular braches to

1) Quadriceps femoris

2) Cutaneous branch – saphenous nerve

Femoral nerve block will facilitate analgesia to anterior thigh, also blocks flexor muscles of hip and knee extensors. 3-in-1 block will block femoral, obturator and lateral femoral cutaneous nerve of thigh from a single injection at the level of inguinal crease. In this block femoral and lateral cutaneous will be blocked while obturator will be often spared.

Femoral nerve block along with the sciatic nerve block will provide excellent block for surgery on knee, leg and ankle. It provides very good post operative analgesia.

It is comparatively easy to block femoral nerve at the level of inguinal crease. A needle directed lateral 1-2 cms to femoral artery with upwards angulation. When nerve stimulator is used, check for the contractions of quadriceps muscle, which produces movement of patella, because femoral nerve supply quadriceps group of muscles. 20-25 ml of the local anaesthetic mixture is infiltrated to block the femoral nerve.

SACRAL PLEXUS:

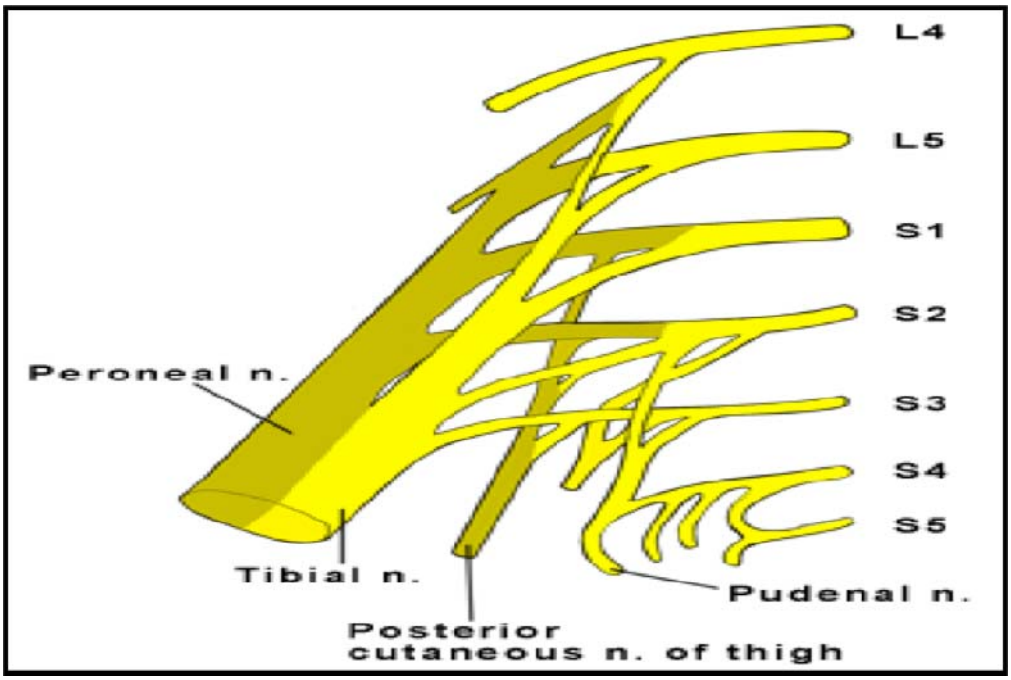


Figure 4 :Sacral plexus

Sacral plexus is formed from anterior rami of the spinal nerves L4, L5, S1, S2, S3, and S4. Each anterior ramus divides into two branches-anterior and posterior. Anterior branches supply to flexor muscles of leg while the posterior branches supply extensor and abductor muscles.

Sacral plexus provides motor and sensory nerves supply to posterior part of thigh, most part of leg, whole of foot. It is part of lumbosacral plexus

SCIATIC NERVE ($L_{4,5}$ $S_{1,2,3}$)

It is the largest nerve in human being, around the size of thumb in adult. It extends from lower spine to toes supplying most of muscles of posterior thigh, leg and foot. The nerve originates in the lower spine as nerve roots exit the spinal cord and extends all the way down the back of the leg to the toes.

It is composed of two components, tibial and peroneal, enclosed in common sheath made up of fibrous tissue. The nerve usually divides into tibial and common peroneal nerve at apex of popliteal fossa.

The muscles supplied by sciatic nerve are as follows-

1) <u>In the thigh</u>-

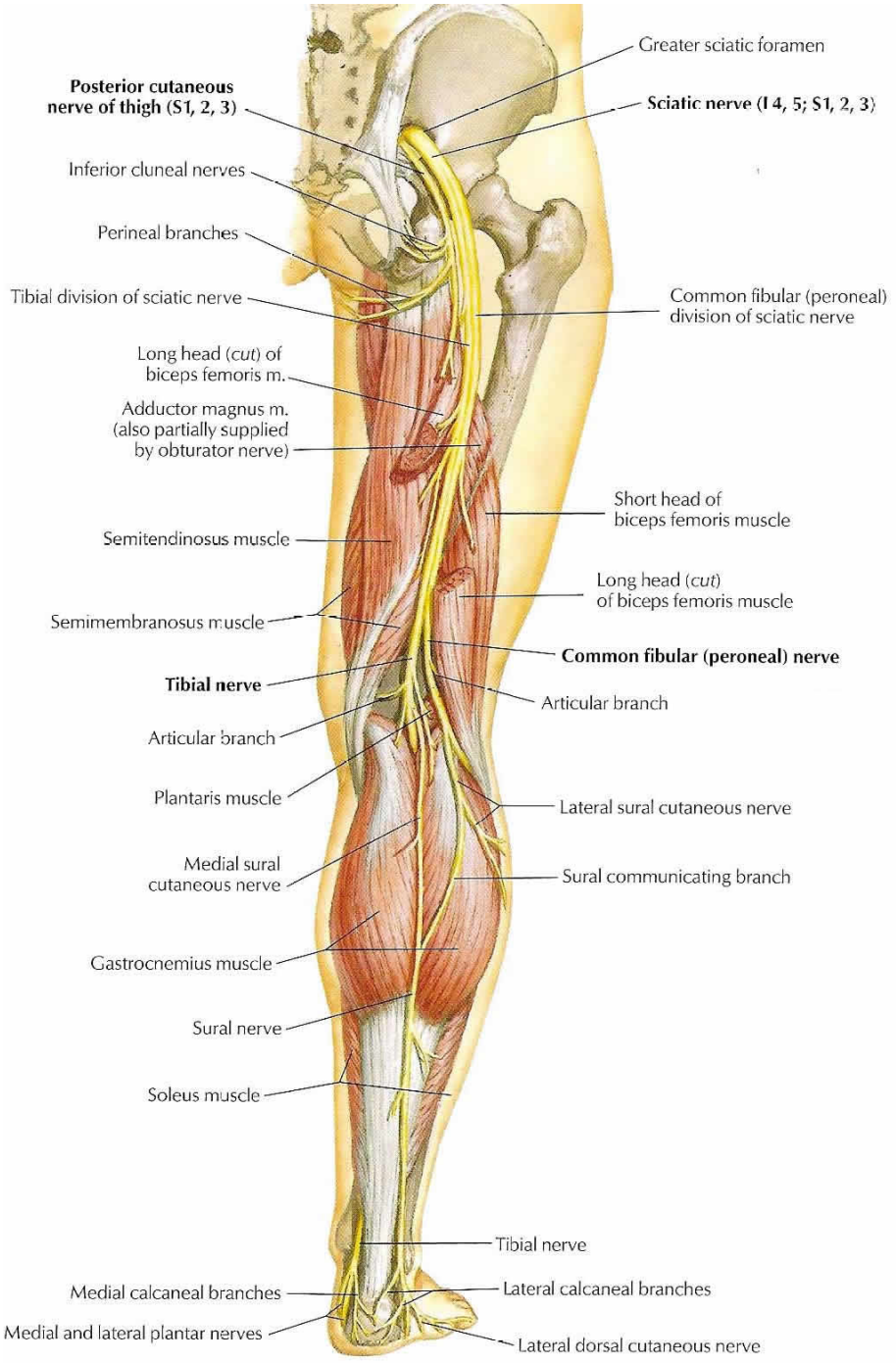
semimembranosus, semitendinosus, biceps femoris and hamstring portion of adductor magnus.

2<u>) In the leg and foot tibial nerve will supply-</u>

Gastrocnemius,soleus,plantaris , tibialisposterior,flexordigitorum longus and flexor hallucis longus.

In the leg and foot common peroneal nerve will supply-short head of biceps femoris, peroneus longus and peroneus brevis.

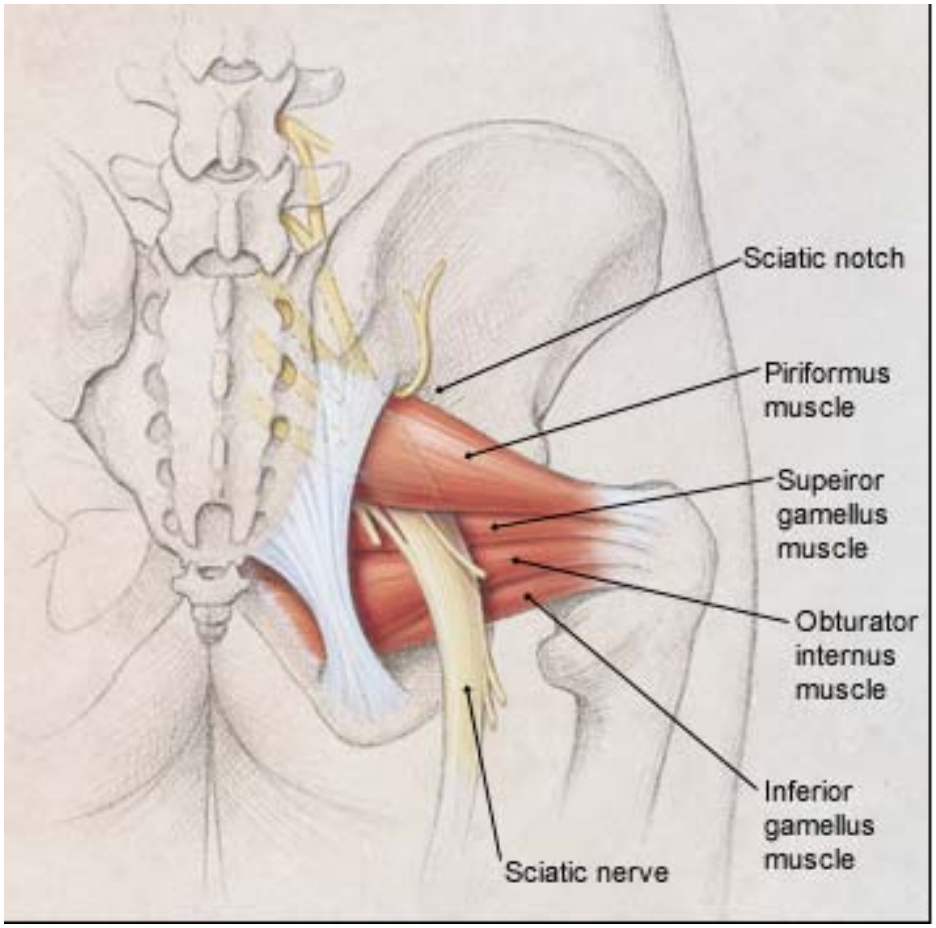
Figure 5: Femoral nerve and its distribution



Relation:

From the pelvis the sciatic nerve leaves via greater sciatic foramen below the piriformis and travels between greater trochanter and ischial tuberosity. It then moves downwards along back of thigh, dividing into tibial and common peroneal nerves at around apex of popliteal fossa.

Figure 6: Sciatic nerve distribution in hip



SCIATIC NERVE BLOCK

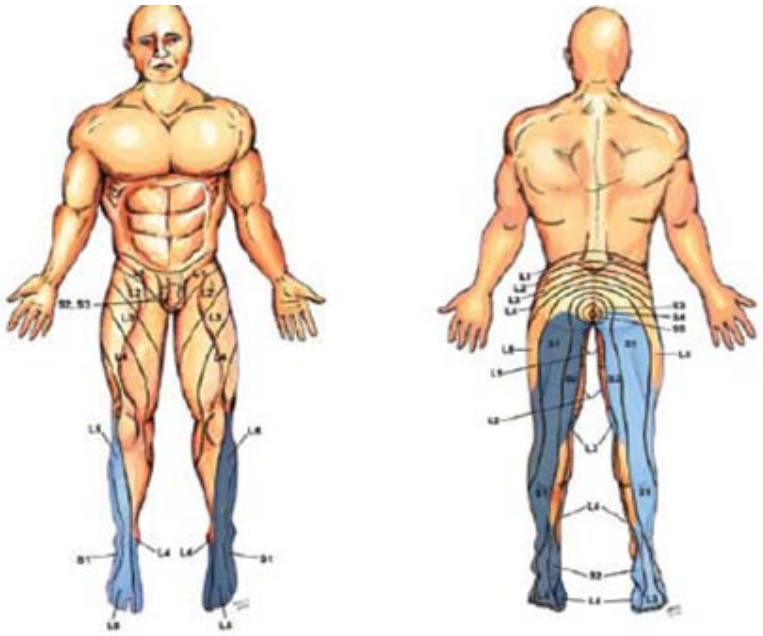


Figure 7: Dermatomal distribution of sciatic nerve

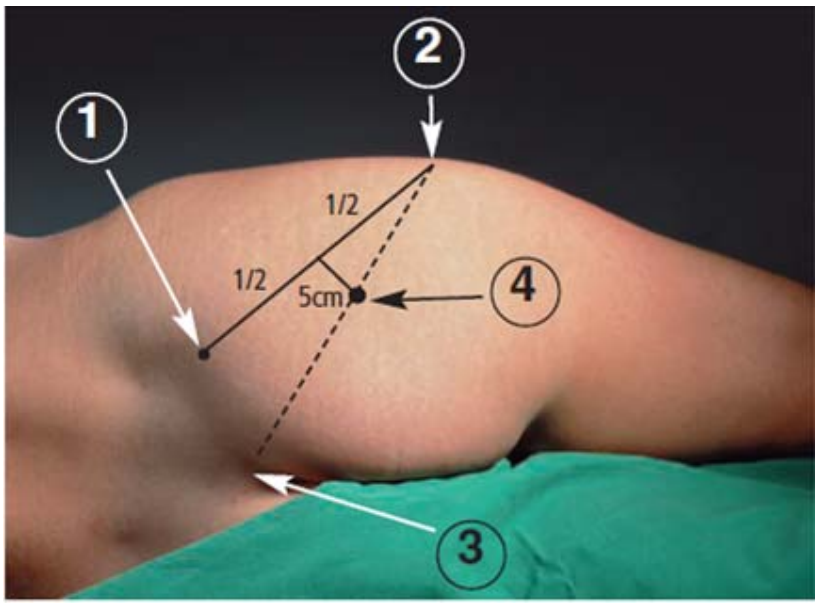
It can be blocked by

1) Labat[12] – the posterior approach-transgluteal approach
2) Mid-gluteal posterior approach
3) Gluteal Approach
4) Raj[15] approach
5) Para sacral approach
6) Anterior approach

Transgluteal approach (according to Labat) [12, 37]

The patient is placed in lateral position with operative site above and flexion given at knee joint of operative limb (SIMS position). The three anatomical landmarks drawn are posterior superior iliac spine, greater trochanter and sacral hiatus.

Figure 8: Site of sciatic nerve block by Labat approach



1. Posterior superior iliac spine
2. Greater trochanter
3. Sacral hiatus
4. Puncture site

Technique:

The three anatomical land marks namely Greater trochanter, posterior superior iliac spine (PSIS) and sacral hiatus are located and marked. A line is drawn between greater trochanter and PSIS. Another line from Greater trochanter to sacral hiatus is drawn. A perpendicular line is drawn from midpoint of line joining greater trochanter and PSIS to the line joining greater trochanter and sacral hiatus. The point of entry of needle is the intersection of the two lines as shown in above figure. Insulated needle connected to the nerve stimulator is introduced perpendicular to skin at that point of intersection.

Upon stimulation of sciatic nerve, contractions of the muscle producing plantar flexion and inversion of the foot or toes due to tibial nerve stimulation are observed. While the stimulation of common peroneal nerve causes dorsiflexion and eversion of foot or toes. When the motor response with current 0.5 mA is obtained, the local anesthetics is injected carefully after repeated negative aspiration for blood .Repeated aspiration is done with every 5ml injection of local anesthesia.

Mid-gluteal posterior approach[37]

Patient is positioned in lateral decubitus position with side of block up. Slight flexion is given at both hips and knees. Buttocks are placed such that it lies 90 degree to the bed. The only landmark for this technique is intergluteal sulcus

Figure 9:Mid gluteal approach

Technique

Regardless of patient gender and body habitus in adults, the sciatic nerve runs 10cms parallel to the midline formed by intergluteal sulcus. So in this approach patient is placed in lateral decubitus position and 10 cms measured laterally from midpoint of intergluteal sulcus. Because of easy visualization, inter gluteal sulcus is chosen. Usually the 10 cms line drawn will come immediately lateral to ischial tuberosity. Using 15cms insulated needle with nerve locator sciatic nerve is stimulated.

Upon good dorsiflexion, eversion and plantar flexion inversion at 0.5mA, local anesthetic drug is injected after repeated negative aspirations for blood.

Gluteal Approach [32,37]

The Patient is positioned in sim's position. The anatomical landmarks are greater trochanter and ischial tuberosity. Here sciatic nerve is covered by gluteus maximus.

Figure 10: Gluteal approach

Technique

Greater trochanter and ischial tuberosity are marked. A line joining these two points is drawn. The site of introduction of needle is midpoint of the line joining greater trochanter and ischial tuberosity. This point represents groove between two muscles namely biceps femoris and vastus lateralis. An insulated needle of 15 cm is introduced attached to nerve locator. After stimulating sciatic nerve at 0.5mA current, local anaesthetic mixture is injected after repeated negative aspiration for blood.

Raj Technique [15, 37]

Figure 11: raj approach

In this approach, sciatic nerve is blocked posteriorly in supine position. Both hip and knee are flexed to 90º angle and foot of the patient is held by assistant. Sciatic nerve becomes superficial by flexion of hip.

Mark greater trochanter and ischial tuberosity. Introduce 15 cm insulated needle attached to nerve locator from midpoint of line joining greater trochanter and ischial tuberosity.

Para sacral Technique[37]

Figure 12: Para sacral approach

This is one of the unique technique in which sciatic nerve is blocked along with obturator nerve. Sciatic nerve is blocked most proximally in this approach. Patient positioned in lateral decubitus position.

Anatomical Landmarks marked are posterior superior iliac spine (PSIS) and ischial tuberosity. A line is drawn between these two points. 10 – 15 cm insulated needle is inserted caudal posterior superior iliac spine. At a depth of 6 – 8 cm needle advances through sciatic foramen to block sciatic nerve. After obtaining dorsiflexion, inversion and plantar flexion, eversion at 0.5 mA current, local anaesthetic mixture is injected after repeated negative aspiration for blood.

PHYSIOLOGY OF PERIPHERAL NERVE STIMULATOR

Peripheral nerve stimulator[32, 37]

In 1912, Von Perthes first said about the use of peripheral nerve stimulator. With increasing interest in regional anesthesia and for the accurate localization of the peripheral nerve for blocks, the interest in the peripheral nerve stimulator has increased.

Basic Electrophysiology

To understand electrophysiology the following two terms should be well understood.

1) RHEOBASE- is the minimal threshold current required to stimulate a nerve with a long pulse width.

2) CHRONAXIE- is the duration of the stimulus required to stimulate at twice the rheobase .It measures the relative excitability of different nerves and nerve fibers.

It is possible to stimulate only motor nerves A-α without stimulating the sensory A-δ and C fibers which causes pain. Even the mixed nerve can be identified by evoking motor response without causing discomfort to the patient.

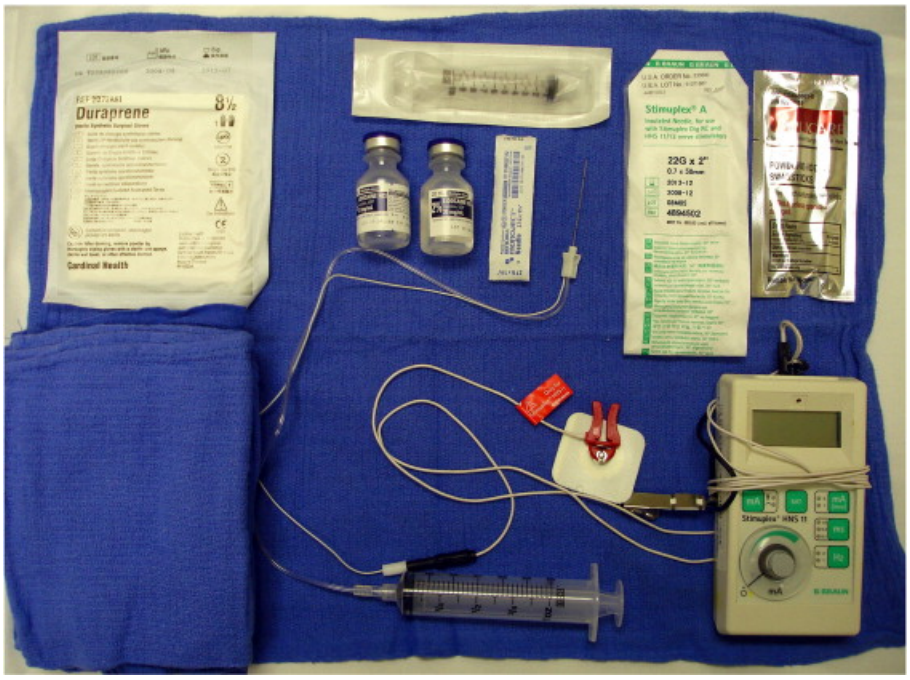
Stimulation intensity is determined by coulomb's law. A very high current is needed when tip of the needle is far from nerve. Due to high strength of current, it may cause pain and also causes systemic effects to the patient. The stimulating current of <0.5mA is associated with high success rates with peripheral nerve blocks using peripheral nerve locator.

Needles

Insulated short and long beveled needles are used for nerve blocks along with nerve locator. The positive electrode of nerve locator is connected to a electrocardiogram electrode while negative to the needle of the nerve locator. These needles come with different sizes and gauges are available.

Choosing the type of needle depends on type of patient adult or paediatric patients. The insulated needles are available from size 2.5 cms to 15 cms. 2.5cms needle with 25 gauge may be used for paediatric patients. 2.5 to 5 cms needle may be used for adult upper limb blocks, while 10 to 15 cms insulated needles are used for lower limb blocks.

Figure 13: nerve stimulator, needles and drugs



Characteristics of an ideal PNS:

1. Constant current output-A particular current not the voltage stimulates the nerve. Therefore, the current delivered by the device should not vary with changes in the resistance of the external circuits.

2. Digital display of the delivered current

3. Variable output control

4. Clearly identifiable polarity

5. Option for different pulses

6. A wide range of current output 0.1-5.0mA

7. Battery indicator

Peripheral nerve stimulator settings:

MIXED NERVE (most peripheral nerves)

Current (dial) -1mA, Current duration-0.1ms, Frequency- 1-2Hz.

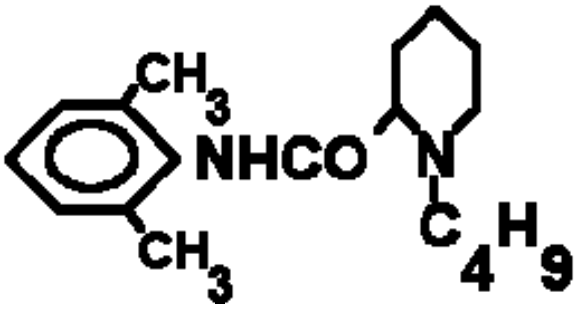
SENSORY NERVE (e.g.-Lateral femoral cutaneous and saphenous nerves)

Current (dial) -2-5mA, Current duration-1ms, Frequency-1Hz

PHARMACOLOGY[32, 33, 34, 35.]

Pharmacological consideration:

a)Pharmacology of Bupivacaine:



BUPIVACAINE MOLECULAR STRUCTURE

Bupivacaine is an amide linked local anaesthetic. It is derived from Mepivacaine and is very stable compound and may be autoclaved repeatedly.

Pka is 8.1

MW- 288

Protein binding - 95%

Lipid solubility- 28

Elimination half life- 210mts

Approximate duration of action - 175mts

Peak time 0.17-0.5 hours

Peak concentration 0.8 microgram/ml

Toxic plasma concentration > 1.5micro gram /ml

Availability:

Ampoule - - 0.5% Bupivacaine hydrochloride with dextrose (heavy) 4cc

Vials - 0.25% and 0.5% Bupivacaine hydrochloride 20cc

Dosage - Maximum dosage 3mg/kg body weight.

Pharmacokinetics:

It is rapidly absorbed from the site of injection, but the absorption rate depends on both vascularity at the region and presence of vasoconstrictors.

High lipid solubility of bupivacaine makes it easy for nerve and vascular tissue penetration.80-95% of the absorbed bupivacaine binds to the plasma alpha 1 acid glycoprotein.

Biotransformation:

Possible path ways of metabolism of bupivacaine include aromatic hydroxylation and conjugation. Only the N-dealkylated metabolite, N-desbutyl bupivacaine has been measured in blood (or) urine after epidural (or) spinal anaesthesia. Alpha1 acid glycoprotein is the most important plasma protein binding site of bupivacaine and its concentration is increased by many clinical situations including post operative trauma.

Excretion:

It is excreted through the kidney; 4-10% of the drug is excreted unchanged.

Mode of Action:

Sodium Channel blockade:

It acts by non depolarization blockade at sodium channels. They impede sodium ion access to the axon interior by occluding the transmenbrane sodium channels thus delaying the process of depolarization and axon remains polarized.

Toxicity:

Toxicity is related to plasma level of unbound drug and more likely due to an inadvertent intravenous injection. Systemic toxicity reactions primarily involve central nervous system and cardio vascular system. The blood level required to produce central nervous system toxicity is less than that required to produce circulatory collapse.

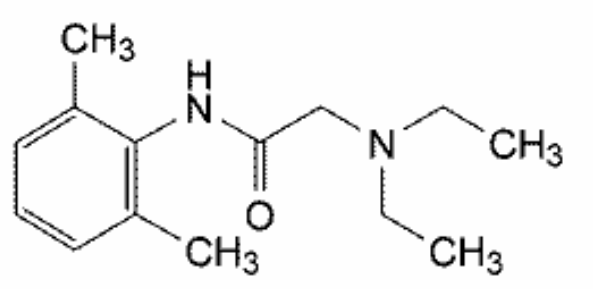
Central Nervous System Toxicity:

Initial symptom includes feeling of light headedness and dizziness, followed by visual and auditory disturbances. Objective signs are excitatory and include shivering, muscle twitching and tremor. Ultimately generalized tonic, clonic seizures occurs.

Cardiovascular System Toxicity:

The rate of depolarization in fast conducting tissue of purkinje fibres and ventricular muscle is decreased. The rate of recovery due to bupivacaine induced block is slower than that of lignocaine. Very high concentration of the drug causes sinus bradycardia and cardiac arrest.

PHARMACOLOGY OF LIGNOCAINE



LIGNOCAINE MOLECULAR STRUCTURE

In 1943 Lofgren synthesized Lignocaine in Sweden. It is chemically a tertiary amide, diethyl amino acetyl, 2, 6 xylidine hydrochloride monohydrate. It is a local anaesthetic of moderate potency and duration but of good penetrative powers and rapid onset of action.

Lignocaine is the standard to which all other local anesthetics are compared. It is currently the most widely used local anaesthetic. In addition, it is a popular antiarrythmic. It can be given by almost any route.

Mechanism of action:

It acts by blocking the ion gated sodium channels and prevents flow of sodium. Threshold potential is not reached and it prevents propagation of nerve impulses. But resting membrane potential is not altered. Lignocaine binds to the inner portion receptor (i.e. Sodium channel) after entering the cell membrane.

Physiochemical properties:

Molecular weight 234

Weak base with a pka 7.6 – 7.8

Very stable, not decomposed by boiling, acids or alkalis

It is less lipid soluble than that of Bupivacaine,

Lipid solubility 2.9

Protein binding 70% to alpha-1acid glycoprotein.

Volume of distribution 91 litres

Clearance 0.95 litres /minute

Elimination half life 96 minutes

Toxic plasma concentration: >5microgram/ml

Pharmacokinetics:

Absorption:

It is absorbed from the site of application or injection into the blood stream. Rate of absorption depends on the vasularity of the area and use of epinephrine.

Metabolism:

Metabolised in liver by oxidative dealkylation to monoethylglycine xylidide followed by hydrolysis of this metabolite to xylidide. Metabolism is dependent on hepatic blood flow.

Monoethylglycine xylidide has 80% activity of the parent drug.

Xylidide has 10% activity of the parent drug.

Onset of action:

Rapid onset of action

- Topical anaesthesia 5-10 mins
- Conduction anaesthesia-For small nerves 5-10 mins, for large nerves 10-15 mins.
- Intravenous administration 1-2 mins

Availability:

a) 2% lignocaine – plain – 30 ml vial –contains methyl and propyl paraben as preservative

b) 2% ligcocaine (xylocard) without preservative – 50 ml vial for intravenous use

c) 2% lignocaine ointment

d) 4% lignocaine with 1 in 200000 Adrenaline – 30 ml vial.

e) 4% lignocaine viscus

f) 4% lignocaine aqueous solution

g) 5% heavy 2 ml ampoules which contain 50 mg of lignocaine / ml with 75 mg – 100 mg of dextrose

h) 5% lignocaine ointment

i) 10% lignocaine spray

Pharmacodynamics:

Local actions:

Causes nerve blockade with loss of pain and temperature sensation, touch, motor power and vasomotor tone in the region supplied by the nerve.

Systemic actions:

Result of systemic absorption from the site of administration or intravenous administration.

Cardiovascular system:

It has a stabilizing effect on the cell membranes of cardiac tissue. Lignocaine depresses myocardial automaticity by antagonizing the spontaneous phase IV depolarization and reduces the duration of effective refractory period. Myocardial contractility and conduction velocity are depressed at higher concentrations. These effects result from direct cardiac muscle membrane changes (i.e.) cardiac sodium channel blockade. It stabilizes the membrane of damaged and excitable cells, tending to suppress ectopic foci.

Central nervous system:

Produces a sequence of stimulation followed by depression. Produces sedation on intravenous administration.

Intravenous administration decreases cerebral blood flow and attenuates the rise in intracranial pressure that accompanies intubation.

Infusion of lignocaine is capable of reducing the MAC of volatile anaesthetics by 40%.

Indications:

1. For infiltration block,
2. peripheral nerve blocks,
3. epidural ,spinal blocks,
4. topical anaesthesia ,
5. intravenous regional anaesthesia,

6. Antiarrythmic- Lignocaine is a class IB antiarrythmic**.** Used in (a) Treatment of Ventricular tachyarrhythmia, (b) In digitalis toxicity because it doesnot worsen AV block (c) Arrhythmias following acute MI during cardiac surgery.

7. Suppresses noxious reflexes such as coughing & sympathetic stimulations associated with endotracheal suctioning and intubation.

8. Prevention or treatment of increases in intracranial pressure during intubation due to its antitussive effect.

9. Reflex induced bronchospasm is also attenuated by iv administration of lignocaine

10. Used as an antiepileptic agent IV

11. Used as an IV analgesic for certain chronic pain states

12. Used as a supplement to general anaesthesia.

Contraindications:

Hypersensitivity

Should not be used with vasoconstrictor in digits of hand, feet and penis

Stokes Adams syndrome

Severe degree of heart block

Doses:

Maximum recommended dose:

a) Plain - 3 mg / kg

b) With adrenaline- 7 mg / kg

c) For reflex suppression - 1.5 mg / kg IV.

Epinephrine

Epinephrine (adrenaline) is the prototype drug among the sympathomimetics.

Functions

- Regulation of myocardial contractility, heart rate, vascular and bronchial smooth muscle tone.
- Potentiates glandular secretions and metabolic processes.
- Agonist of α- adrenergic, β 1 and β2 receptors.
- Poorly lipid soluble hence lack of cerebral effects.

Uses

- Addition to local anaesthetic solution in order to decrease systemic absorption and to prolong duration of action.
- Treatment of life threatening allergic reaction.
- During CPR as a very important therapeutic drug. Continuous infusion to increase myocardial contractility.

REVIEW OF LITERATURE

1. Beck[2] in 1963 described the anterior approach for sciatic nerve.

He identified three points

1. Anterior superior iliac spine (ASIS)
2. Pubic tuberosity
3. Greater trochanter

He connected ASIS to pubic tuberosity and draw a line parallel to it From greater trochanter. From the midpoint of first line he drew a perpendicular line to the second line. From the point of intersection of the second line with the perpendicular line, he gave sciatic nerve block[2].

2. Chelly[7] JE, **Delaunay L.** did a comparative study on Sciatic nerve block. He did study 22 patients with different concentration of mepivacaine. He draw a line connecting inferior border of ASIS to the superior angle of pubic symphysis. A perpendicular line dividing the first line was drawn and extended 8 cm downwards. The needle was passed perpendicularly and identification of sciatic nerve done at a mean depth of 10.5 cm, with nerve stimulator.

Landmarks are written in 1.3minutes (0.5 to 2 minutes), sciatic nerve was identified in 2.5 minutes (1.2 to 5 minutes) using nerve locator.Onset of sensory nerve block of both common peroneal nerve and tibial nerve distribution was achieved at a mean of 15 minutes (5 to 30 minutes). Rapid onset was seen in patients given only mepivacaine than combination of mepivacaine and ropivacaine (10 minutes [5 to 25 minutes] vs 20 minutes [10 to 30 minutes] with $P < 0.05$). Duration of block was 4.6 hours (2.5 to 5.5 hours) with mepivacaine alone, while along with ropivacaine, duration of block was 13.8 hours (5.2 to 23.6 hours) with $P < 0.05$[7].

3. Pierre Pandin [3]and Nathalie Vancutsem et al conducted a random study in which 119 patients with ASA status I and II posted for below knee surgery. Fifteen ml and thirty ml of 0.5% ropivacaine solution were injected near femoral and sciatic nerve through anterior approach. Landmarks were drawn in 1.7 min. Average procedure time was 4.2 minutes. Femoral nerve block was successful in 89.9%, while sciatic nerve block in 94.9%. Motor block in tibial (97.4%), common peroneal (85.7%) and femoral (98.3%), and nerve regions (modified Bromage's scale > 2)[4].

They concluded that combined anterior approach for both sciatic and femoral nerve by a single skin needle entry is reliable and easy for lower limb surgery in supine position.

4. **Alain C. Van Elstraete[11] and Claude Poey et al** conducted a study with the new landmark for anterior approach, using inguinal crease and femoral artery and the effect of external rotation of the leg during this technique. The sciatic nerve identified twice in 20 patients scheduled for ankle or foot surgery.

First leg in neutral position and then in externally rotated position. Point of needle insertion is 2.5 cms below the inguinal crease and 2.5 cms medial to femoral artery. 15 cms insulated needle was directed postero-laterally with 10° to 15° to vertical plane. At a depth of 10.6 ± 1.8 cms sciatic nerve detected with leg in the neutral position and 10.4 ± 1.5 cms with leg in externally rotated position . The anatomic landmarks were identified in 28 ± 15 seconds and 26 ± 14 seconds in neutral and externally rotated position respectively. Sciatic nerve was located in 79 ± 53 seconds and 46 ± 25 seconds for neutral and externally rotated positions respectively, with $P < 0.006$. Their conclusion was inguinal crease and femoral artery are reliable land marks and the optimal position of leg is externally rotated position for anterior approach for sciatic nerve block.

5. Jerry D. Vloka[9] and Admir conducted a study in 10 lower limbs of 5 cadavers. They studied the effects of rotation of leg in locating the sciatic nerve by anterior approach. They studied the leg rotation effect on needle plane need to reach the sciatic nerve. They studied with legs in neutral, 45 degree in internal and external rotation. In 80% attempts in neutral position, the needle was not fully advanced due to obstruction by lesser trochanter. Medial redirection of the needle (10° to 15°) made the needle to pass lesser trochanter but tip of needle was too medial to sciatic nerve. Internal rotation of leg made all needles to pass lesser trochanter. Their conclusion was internal rotation of leg will facilitate needle insertion for anterior approach to the sciatic nerve block.

6. Fuzier[13] R, **Albert N** et al. conducted a comparative study between anterior approach and lateral approach with the patient in the supine position. 59 patients posted for traumatic lower limb surgery were studied for anterior vs lateral approach to sciatic nerve block. Using 15 cm insulated needle with nerve locator sciatic nerve was identified. 0.75% of 25 ml ropivacaine was injected. The mean procedure time was 4.9 ± 4.0 minutes in anterior and 6.1 ± 6.9 minutes in lateral group. The sciatic nerve was located at a mean depth of 107 ± 17 mm in anterior and 91 ± 20 mm in lateral group (with $P < 0.05$). The

success rate was same in both groups (77% in anterior and 79% in lateral group) but the failure rate was higher in the anterior approach (86% in anterior and 33%in lateral approach, with $p<0.05$).

7. **Marty[21]L. Ericksen Jeffrey D.** showed relationship of sciatic nerve to the lesser trochanter using MRI in 20 patients in the supine position. Study was done at lesser trochanter level and at 1 cms, 2cms, 3cms and 4cms inferior to the lesser trochanter. In 19 out of 20 patients, sciatic nerve was medial to femur at 4cms inferior to lesser trochanter. In 13 of 20 patients sciatic nerve was lateral to femur border at lesser trochanter level. In classic description of anterior approach to sciatic nerve, needle is passed medially at the level of the lesser trochanter. In contrast, in this study at 4 cm below lesser trochanter, sciatic nerve was medial to femur in 19 of 20 patients.

8. **Raghu S. Thota[22], Ajay Aravind et al** did study for anterior approach using fluoroscopy for calcaneal fractures. Lesser trochanter of femur was identified using C arm fluoroscopy and a small amount of contrast material was passed through 22 gauge 150mm spinal needle for needle placement confirmation. Then 20 mL of 0.25% bupivicaine was injected. The anterior approach when combined with fluoroscopy provides better and reliable block.

MATERIALS AND METHODS

Study design:

This is a single blinded, prospective, randomized study. This study was done at Government Stanley medical college and hospital, Chennai during the period of November 2011 to May 2012. After obtaining clearance from the Institutional Ethical Committee of the Stanley Medical College, Chennai-1, a pilot study was done to calculate the sample size.

A pilot study with a sample size of 5patients in each group was done before the start of the study to decide on sample size. The sample size calculated based on the formula given in monographers on statistics and applied probability.

Formula:

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 2s^2}{d^2}$$

Where

$Z_{1-\alpha/2}$ = 1.96 (5% alpha level of significance)

$Z_{1-\beta=}0.842$ (80% power)

D = difference between two means

$S = S_1+S_2 / 2$

On entering the values, the mean procedure time observed in the pilot study for single skin site needle technique was 7.5min ± 3.2min, and for classical two skin needle technique was 10.1±6.8 seconds.

$$N = 2 \text{ X } (1.96 + 0.842)^2 (3.2+6.8/2)^2/ (10.1-7.5)^2$$

$$N = 2 \text{ X } 7.85 \text{ X } (10/2)^2/ (2.6)^2$$

$$N = 15.7 \text{ X } (5)^2/ 6.76$$

$$N = 15.7 \text{ X } 25/ 6.76$$

$$N = 58.06$$

Sample size taken as in each group. 60 patients were included in each group. 120 patients of ASA I – II physical status who got admitted for below knee surgical procedures were taken into consideration.

The 60 patients are divided into two groups as follows-

Group ONE – single needle technique

Group TWO – Classical two needles technique.

Inclusion criteria:

Age 20-60 YRS

Both sexes

ASA I-II undergoing surgery for both elective/emergency below knee.

Exclusion criteria:

Pregnancy, psychiatric illness.

Infection at the puncture site

Allergy to amide local anesthetics

MATERIALS

The following materials were needed for the study:

i. Injection 2% lignocaine – 20 ml

ii. Injection 0.5% bupivacaine – 20 ml

iii. Injection adrenaline used at dosage of 5 microgram / ml

iv. Distilled water-20 ml

v. Injection midazolam at dosage of 20 microgram / kg

vi. Injection fentanyl at dosage of 1 microgram / kg

vii. One 20ml syringe for administration of local anaesthetic mixture

viii. Sterile towels and 4*4 gauge packs

ix. Sterile gloves, Marking pens and Surface electrodes

x. One 25g needle for skin infiltration

xi. **Nerve stimulator** - Stimuplex DigRc-B.Braun

xii. **Needle -** 22 gauge, 5 cms -long and 15cms, short bevelled insulated needle (StimuplexDig, B.Braun)

xiii. ASA Standard monitors – pulse oxymetry (SPO2), non invasive blood pressure (NIBP) and electrocardiogram (ECG).

xiv. Appropriate size endotracheal tubes and laryngoscopes.

xv. Intravenous fluids, intravenous cannula and emergency drugs.

PROCEDURE:

Drugs: 20 ml of 2% Lidocaine with 5 microgram of adrenaline/ml, 20 ml of 5% bupivacaine and 20 ml of distilled water are kept Ready.

After establishing an Intravenous line, patient was positioned supine as necessary for combined sciatic and femoral block.

Classic Anterior Approach of Sciatic Nerve Block[2]:

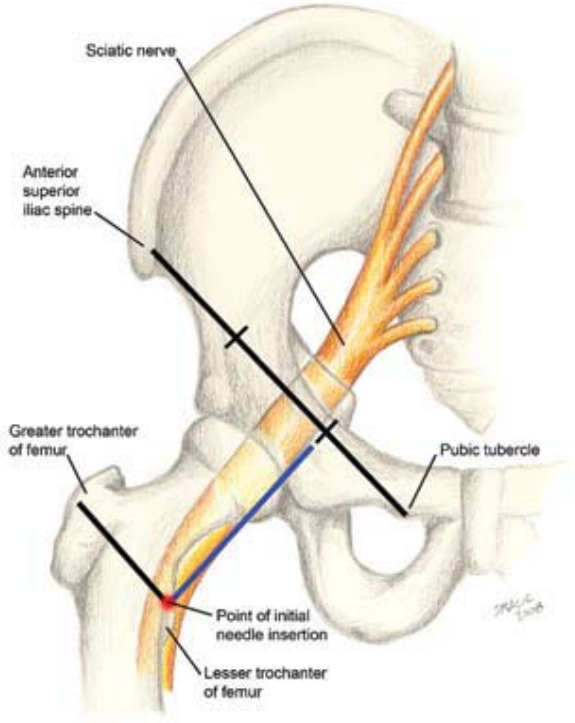


Figure 14: Land Marks of classic anterior approach

Anterior approach to sciatic nerve was developed to overcome problem of patient positioning. The land marks for the classical approach are ASIS, PUBIC TUBERCLE and GREATER TROCHANTER of femur. First a line joining ASIS and pubic tubercle is drawn. This represents the inguinal ligament. Another line joining the greater trichinae is drawn parallel to the first line. From the first line at

the junction of lateral 2/3rd and medial 1/3rd a perpendicular line joins which intersects at the 2nd line. Through the intersecting point anterior approach of sciatic nerve performed.

With the help of the nerve stimulator the end point for locating the nerve , either dorsi flexion or plantar flexion of the foot, which is considered as the evoked motor response with 0.5mA as the lower limit of current used.

CLASSICAL TECHNIQUE FOR FEMORAL NERVE BLOCK

Anatomic Landmarks: Inguinal crease, femoral artery, anterior superior iliac spine.

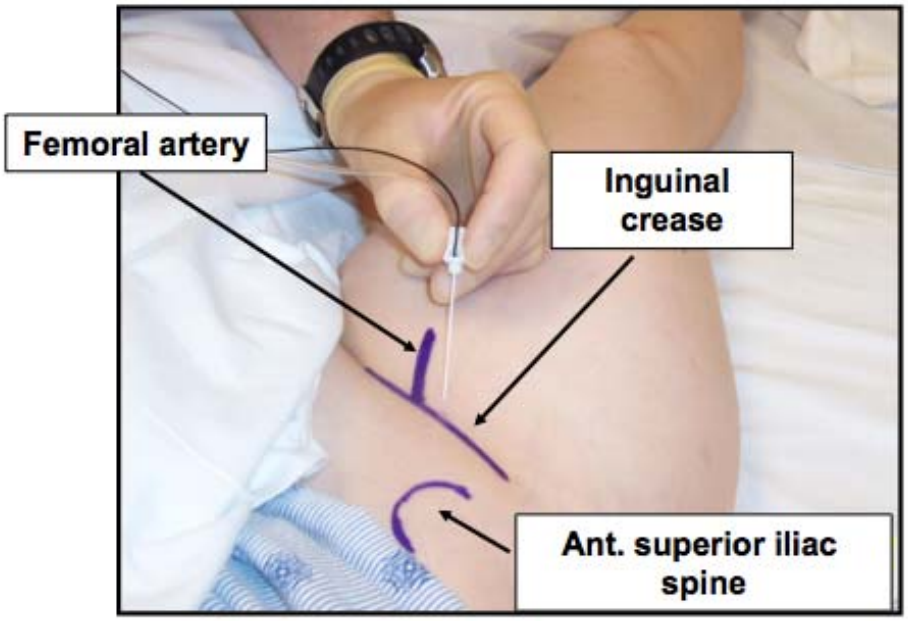


Figure 15: Land mark for classical femoral block

Approach and Technique:

At the level of inguinal crease the femoral artery is palpated. A 22 gauge insulated needle is connected to a nerve stimulator. The point of entry of needle is around 1 cms lateral to femoral artery at inguinal crease. Needle is directed upwards at an angle of 45° angle to skin and directed laterally.

Avoid medial direction of the needle because of femoral artery puncture, which is present medial to femoral nerve. The stimulation of femoral nerve is identified by contraction of quadriceps and patellar movement known as patellar dance. The presence of muscle contraction with current of 0.5 mA is assessed. Then, inject 20 to 25 ml of local anesthesia solution after careful aspiration, every 5 ml to prevent inadvertent injection into femoral artery.

Anatomical Land marks for single needle technique[3] :

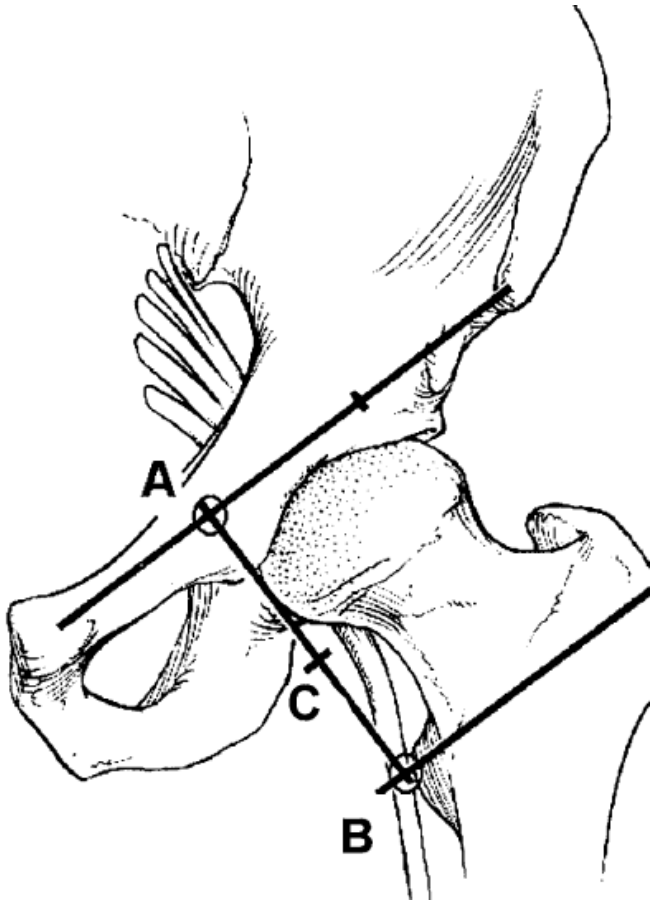


Figure 16 : land mark for new single skin site approach for both femoral and sciatic nerve

Patient in the supine position

a) 1st line is drawn connecting ASIS and pubic tubercle

b) 2nd line drawn parallel to 1st line passing along the greater trochanter.

c) The 1st line is divided into three equal parts. From the junction of lateral 2/3rd and medial 1/3rd (point A) a perpendicular line drawn.

d) The point of intersection of second line by first line is point B.

e) The midpoint of the line AB (point C) IS point of needle entry for giving block.

Under strict aseptic precautions local anesthetics solution was prepared and all the equipments, needed like nerve stimulator, insulated needle, syringe were kept ready.

First the **femoral nerve** was blocked using the nerve stimulator .the needle advanced from point C, in direction of 45° cephalad angulation with 10° medial angulation, until dancing of patella seen due to stimulation of femoral nerve at a depth of 5–6 cm . Nerve stimulator output initially 2mA current was used first to identify the nerve and then gradually reduced to 0.5mA till the response is present. The patella dance was considered as the evoked motor response or end point of nerve location. When the response is present at 0.5mA 25ml of the mixture of local anaesthetic solution injected after negative aspiration.

The **sciatic nerve block** was done after the blockade of femoral nerve with same point of needle entry; the needle was withdrawn to the level of subcutaneous tissue, and then redirected at 10° lateral angle with 80° caudal angle. Initially 2mA Strength was used to first identify the nerve. At a depth of 9–13 cms, the sciatic nerve was identified with motor response related to the sciatic nerve –plantar flexion or foot inversion is noted. Common peroneal nerve stimulation will cause dorsiflexion and eversion of foot and tibial nerve stimulation will cause plantar flexion with inversion of foot, also causes flexion of toes. And gradually reduced to 0.5mA till the foot eversion (or) plantar flexion movement noticed by moving the needle. When the plantar movement is present with 0.5mA 35ml of the prepared local anaesthetic solution was injected after careful aspiration.

Intensity of motor and sensory block was assessed every 5 min till 40 min after completion of procedure. Then the patient is assessed every hour after the surgery till the motor and sensory function recovered to know about the recovery time.

The scale used in this study to know intensity of motor block is No block, Partial and Complete block.

The assessment of sensory block was done by PIN PRICK sensation in the anterior part of thigh (for femoral nerve), dorsal aspect of the foot (for common peroneal nerve) and plantar aspect of foot (for tibial nerve). Only in patients having pin prick sensation completely absent are considered as, complete sensory block.

To assess the intensity of motor block dorsiflexion and inversion, plantar flexion and eversion was done by patient. Depending on intensity, the block was classified into No block, partial block and complete block. Only when femoral, tibial and common peroneal muscles were blocked, the motor block was quantified as to complete block.

Duration of sensory block is defined as time interval between onset of block to the recovery of pain sensation. Duration of motor block is defined as time interval between onset of block the recovery of motor function. After confirming the adequacy of block, surgery was allowed to proceed. Complications such as vascular injury, neurological deficits, anaphylaxis and toxicity of the drug were taken into consideration.

PARAMETERS OBSERVED

PRIMARY OUTCOME MEASURES:

Performance time- Time from insertion of needle to completion of block

Onset time for sensory block (min) - Time from completion of block to onset of complete sensory block.

A) **Onset time for SENSORY femoral nerve block(min**)-Time from completion of block to loss of pinprick in anterior and medial part of thigh, medial part of leg.

B) **Onset time for SENSORY sciatic nerve(min)-**Time from completion of pin prick in posterior part of thigh, all part of the leg except medial part.

Motor block

Complete block - No movement against gravity,

Partial block - Minor movements of toes possible,

No block - Normal range of movements present.

Duration of sensory blockade - Duration of time interval from

Completion of block to requirement of the rescue analgesia.

Duration of motor blockade- Duration of time interval from

Completion of block to return of full motor power.

Duration of analgesia

The pain score assessed by visual Analogue scale having 10cm length numbered from 0 - 10. Patient was explained about visual Analogue scale as 0 - No pain and 10 means the worst possible pain and was asked the score in visual analogue scale.

The patient was observed every 30 minutes post operatively till the motor block was reversed and thereafter hourly for 12 hrs. Time at which VAS score is greater than 5 was noted and patient was given intramuscular Tramadol as rescue analgesia. Duration of post operative analgesia is the period of time after the surgery till the patient needed analgesic, that is VAS score more than 5.

SECONDARY OUTCOME MEASURES:

Complications- Accidental vascular puncture, neurological deficit, anaphylaxis, local anaesthesia toxicity.

OBSERVATION AND RESULTS

STATISTICAL TOOLS

The information collected regarding all the selected cases were recorded in a master chart. The observations were compiled and data's were expressed as mean± SD.

Quantitative analysis was compared with independent sample student's t test. Qualitative analysis was compared with chi-square test. When using these tests to compare mean among two groups, p-value of less than 0.05 was taken as significant.

All analyses were done using SPSS version 11.5 statistical software.

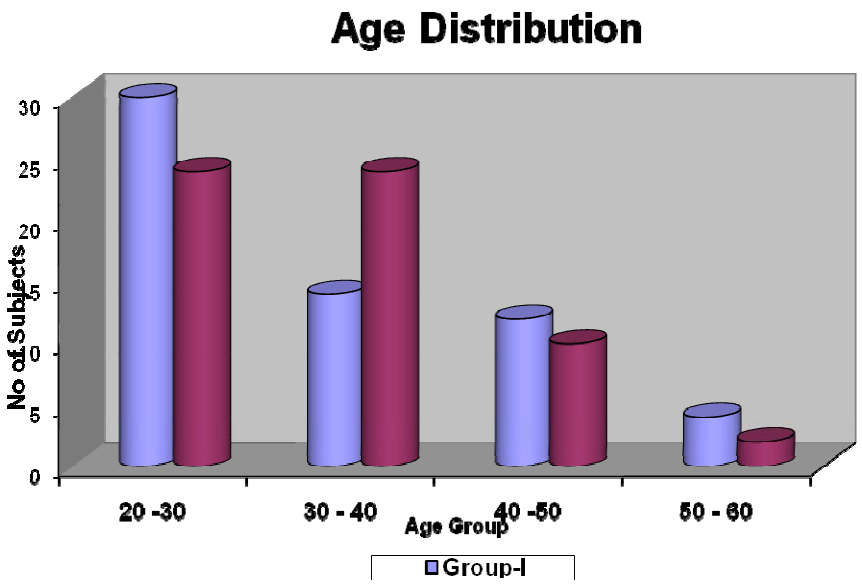
GROUP ONE - SINGLE NEEDLE TECHNIQUE

GROUP TWO- TWO NEEDLE TECHNIQUE

The study was done with the patient's age ranging from minimum of 20 years to maximum of 60 years.

Table-1: Age Distribution

	Group-ONE(60)		Group- TWO(60)	
Age distribution (in Years)	**Number**	**Percentage**	**Number**	**Percentage**
20 -30	30	50.00	24	40.00
30 – 40	14	23.30	24	40.00
40 -50	12	20.00	10	16.70
50 – 60	4	06.70	2	03.30
Range	35		35	
Mean ±Sd	33.12 ± 10.91		34.08 ± 8.73	
t-value	0.54			
Df	118			
p-Value	0.59 (Not Significant)			



Sex Distribution:

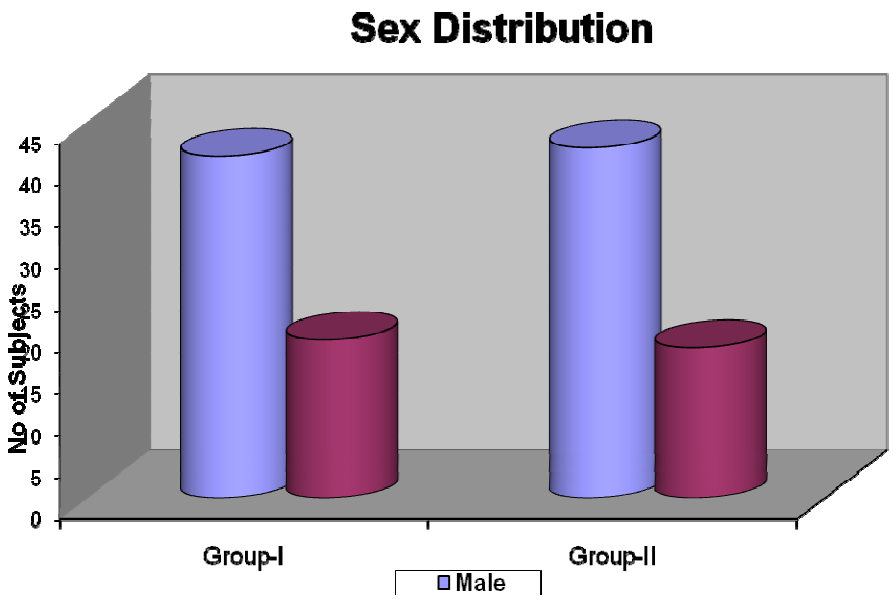
Table-2 : Age distribution by Sex

Age Distribution	Group-ONE(60)				Group-TWO(60)			
	Male		**Female**		**Male**		**Female**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
20 – 30	17	41.50	13	68.40	14	33.30	10	55.56
30 – 40	13	31.70	01	05.30	17	40.50	07	38.89
40 – 50	07	17.10	05	26.30	09	21.40	01	5.55
50 – 60	04	09.80	00	00.00	02	04.80	00	0
Range	35		9		35		9	
Mean ± Sd	34.49±11.12		30.16±10.10		35.67 ± 9.26		30.39 ± 6.08	
t-value	1.44				2.22			
Df	58				58			
p-value	0.15 (Not Significant)				0.13 (Not Significant)			

Table-3 : Sex Distribution

Sex	Group-ONE(60)		Group-TWO(60)	
	Number	Percentage	Number	Percentage
Male	41	68.30	42	70.00
Female	19	31.70	18	30.00
Total	60	100	60	100
Chi square	0.04			
df	1			
p-value	0.84 (Not Significant)			

In group ONE, the number of males are 41 and females 19, while in group TWO the number of males are 42 and females 18. Both the groups are comparable with gender distribution.

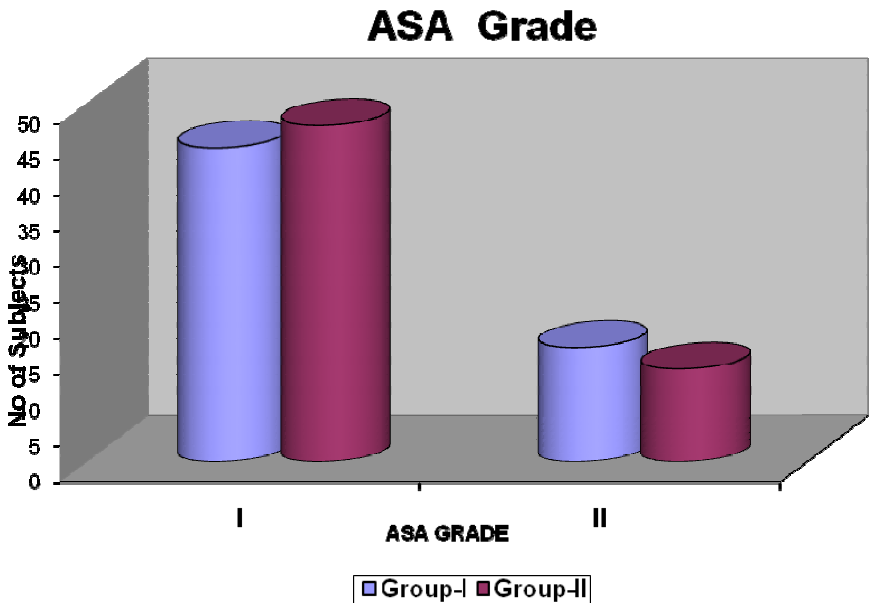


ASA Class Distribution:

Table-4 : **ASA Grade**

ASA Grade	Group-ONE(60)		Group-TWO(60)	
	Number	Percentage	Number	Percentage
I	44	73.30	47	78.30
II	16	26.70	13	21.70
Chi square	0.41			
df	1			
p-value	0.52 (Not Significant)			

In group ONE 44 patients belongs to ASA 1 and 16 to ASA 2.While in Group TWO 47 belongs to ASA 1 and 13 to ASA 2. Both the groups were comparable in terms of ASA grading.

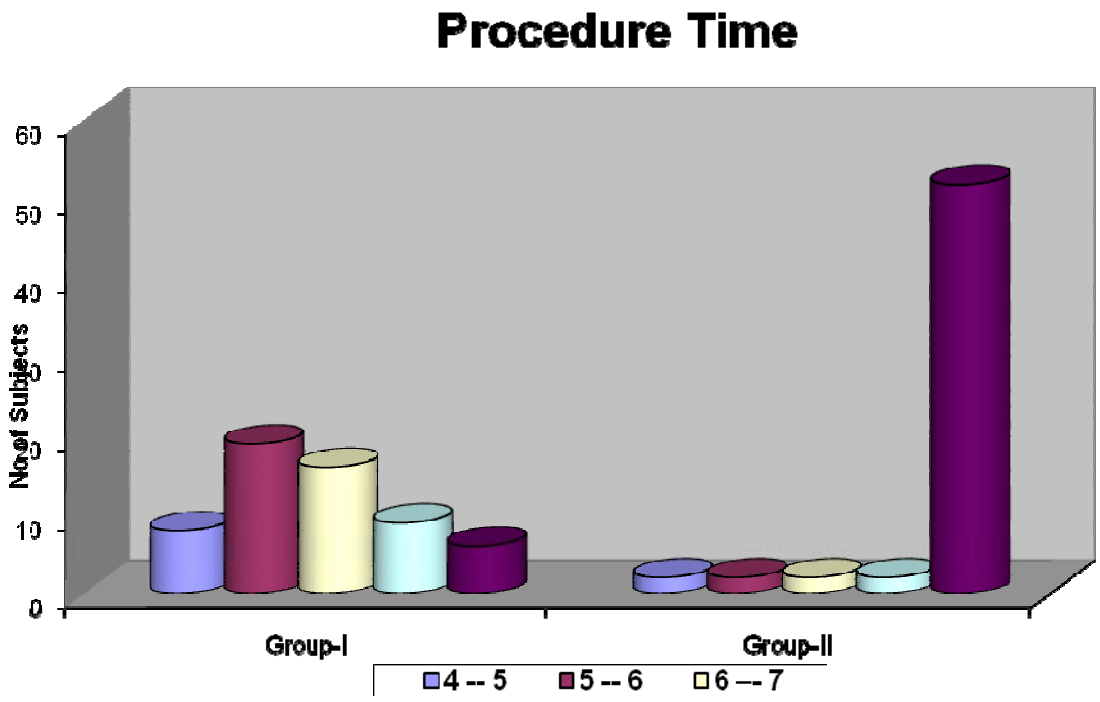


Time for procedure:

The average time that is required for the performance of the block in Group ONE was around 6.35 minutes. The time varied from 4minute – 9 minutes. While in group TWO average time required is 14.91 minutes, with Time varied from 8 to 18 minutes. With p value 0.001, there is statistically significant difference in procedure time with less time for new technique.

Table-5:Procedure time

Time (in Mints)	Group-ONE(60)		Group-TWO(60)	
	Number	Percentage	Number	Percentage
4 – 5	09	13.80	2	3.30
5 – 6	19	32.80	2	3.30
6 –- 7	16	27.60	2	3.30
7 –-8	10	15.50	2	3.30
8 – 18	6	10.30	52	86.70
Mean ± sd	6.34 ± 1.21		14.91 ± 2.52	
t-value	23.07			
Df	108			
p-value	0.0001 (Significant)			

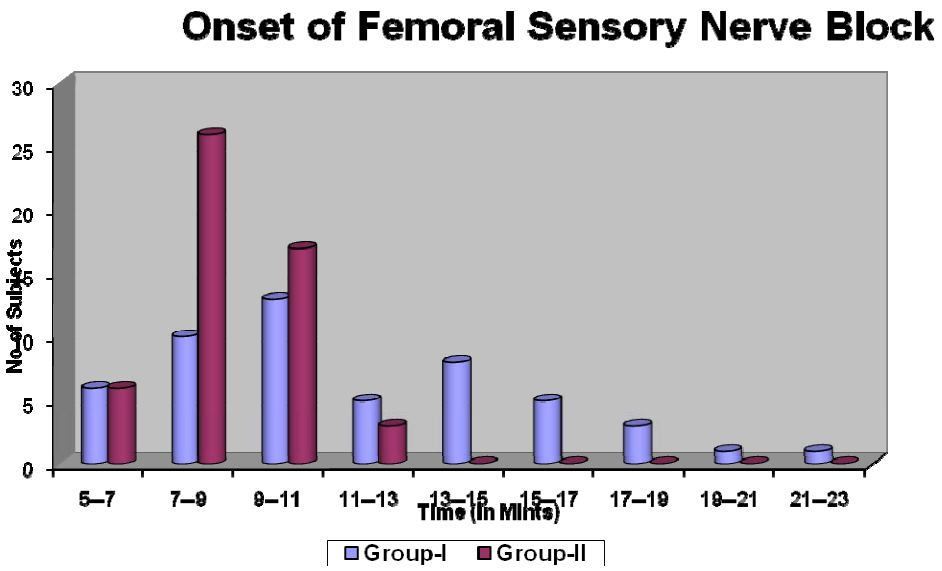


Femoral Nerve Block:

The average onset time of sensory block in GROUP ONE is 11.53 minutes and the range varied from 5min to 23min. In case of GROUP TWO is 8.74 minutes with range varying from 5min to 13 minutes. Since the p value is 0.0001 there is statistically significant difference favoring early onset of femoral block in classic technique.

Table-6 Onset of Femoral Sensory Nerve Block

Time (in Mints)	Group-ONE (52)		Group-TWO(51)	
	Number	Percentage	Number	Percentage
5--7	6	11.50	06	11.50
7--9	10	19.20	25	50.00
9--11	13	25.00	17	32.70
11--13	5	09.60	03	05.80
13--15	8	15.40	00	0
15--17	5	09.60	00	0
17--19	3	05.80	00	0
19--21	1	01.90	00	0
21--23	1	01.90	00	0
Mean ± sd	11.53 ± 3.89		8.74 ± 1.52	
t-value	4.82			
Df	102			
p-value	0.0001 (Significant)			



Sciatic Nerve Block:

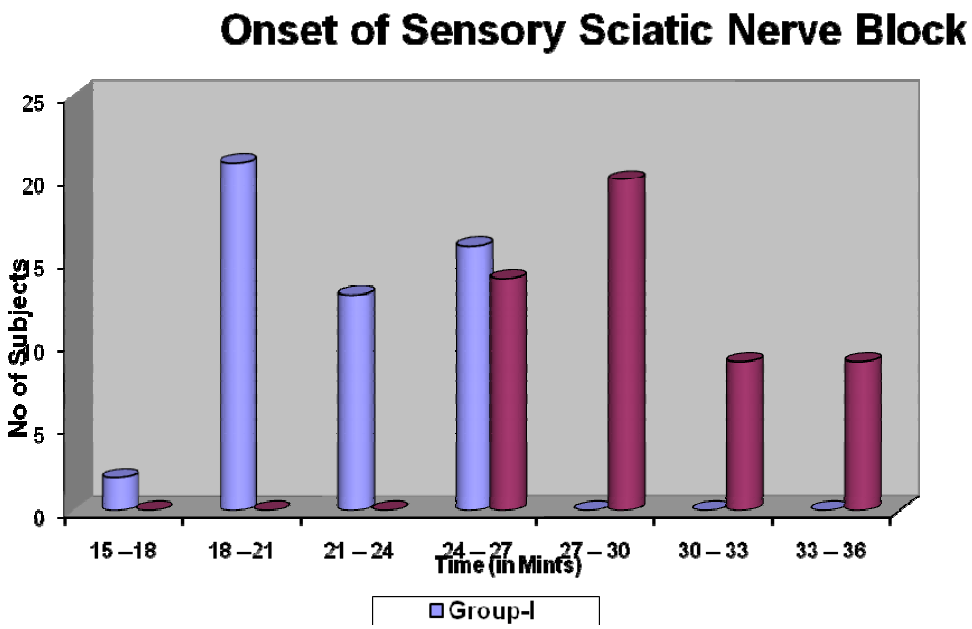
In group ONE patients, the average onset time for sciatic sensory block 21.91 minutes. The range varied from 15 to27 minutes. In group TWO patients, the average onset of time was 29.23 with range varying from 24 min to 36 minutes. Since the p value is 0.0001, there is statistically significant difference with short onset time in new single needle technique.

Out of the 60 cases, in 52 cases the sensory blockade was well taken up. In 8 cases it was spared, 5 cases were due to failure of sciatic nerve block and 3 due to femoral nerve block.

In case group B, 51 cases sensory block was taken well. In 9 cases the block was spared. 6 cases were due to failure of sciatic nerve block while 3 cases were due to failure of femoral nerve block.

Table-7 : Onset of Sensory Sciatic Nerve block

Time (in Mints)	Group-ONE (52)		Group-TWO(51)	
	Number	Percentage	Number	Percentage
15 --18	2	03.80	0	0
18 --21	21	40.40	0	0
21 -- 24	13	25.00	0	0
24 -- 27	16	30.80	14	26.90
27 -- 30	0	0	19	38.50
30 -- 33	0	0	09	17.30
33 -- 36	0	0	09	17.30
Mean ± sd	21.91 ± 3.07		29.23 ± 2.92	
t-value	12.44			
Df	102			
p-value	0.0001 (Significant)			

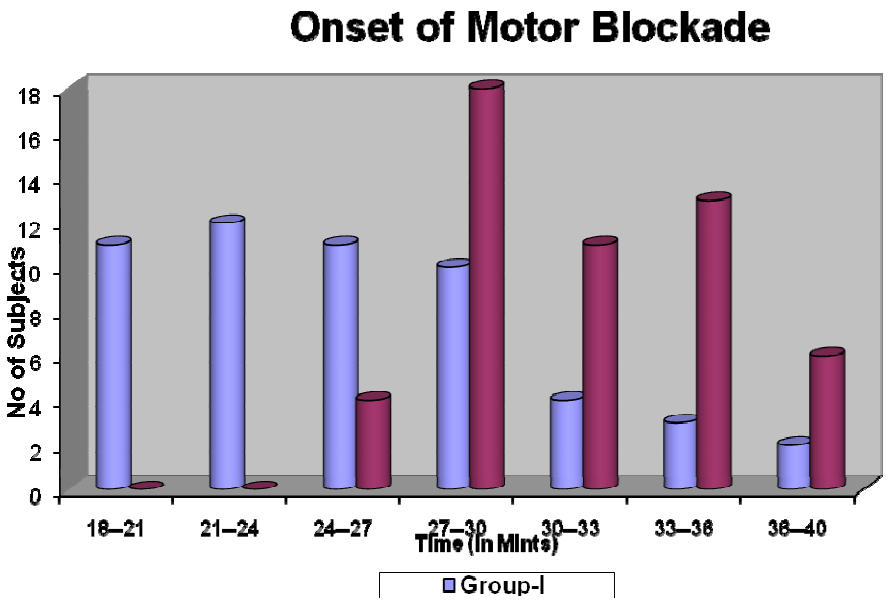


Onset of motor blockade

In group A the average onset of motor blockade is 25 mins, with range from 18 to 40 mins. In group B the average onset of motor blockade is 31 mins, with range from 24 to 40 mins. There is no statistically significantly difference between two groups even though new single technique has early onset of action.

Table-8 : Onset of Motor blockade

Time (in Mints)	Group-ONE(52)		Group-TWO(51)	
	Number	Percentage	Number	Percentage
18--21	11	21.20	0	0
21--24	12	23.10	0	0
24--27	11	21.20	4	7.70
27--30	09	18.90	17	34.60
30--33	04	07.70	11	21.20
33--36	03	05.80	13	25.00
36--40	02	03.80	06	11.50
Mean ± sd	25.58 ± 5.09		31.57 ± 3.53	
t-value	7.00			
Df	102			
p-value	0.15 (not Significant)			



Degree of motor blockade

Block was considered failed, if no pain relief to pinprick even after 40 min after the performance of the block.

The block is considered under three degrees-

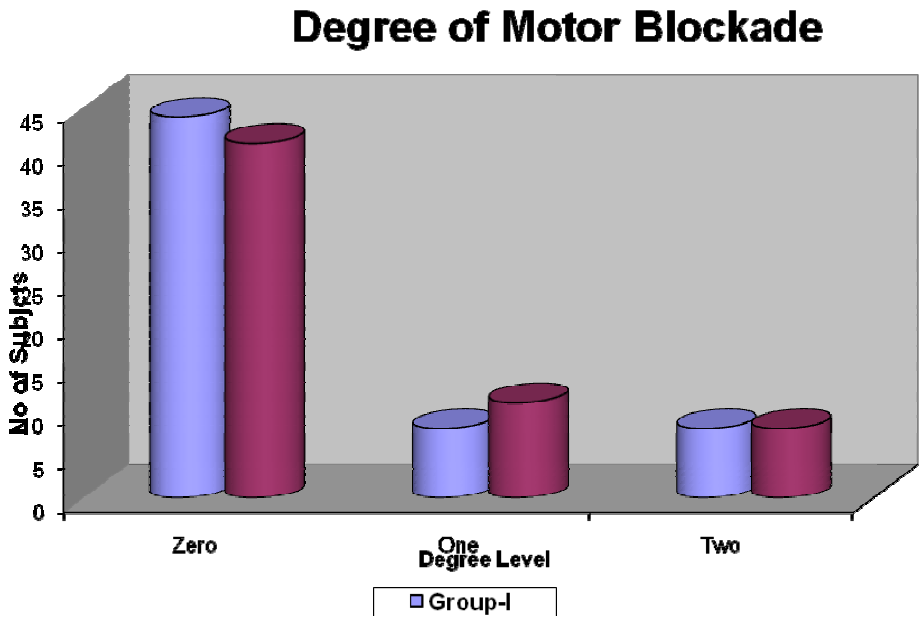
0- Complete motor blockade

1- Partial motor blockade

2- No motor blockade.

Table-9: Degree of Motor blockade

Degree	Group-ONE(60)		Group-TWO(60)	
	Number	Percentage	Number	Percentage
0	44	73.30	41	68.30
1	08	13.30	10	16.70
2	08	13.30	09	13.30
Chi-square Value	0.58			
df	2			
p-value	0.75 (Not Significant)			



In group ONE **In group TWO,**

Complete motor blockade - 73.3% Complete motor blockade-68.30%

Partial motor blockade- 13.3% Partial motor blockade-18.80%

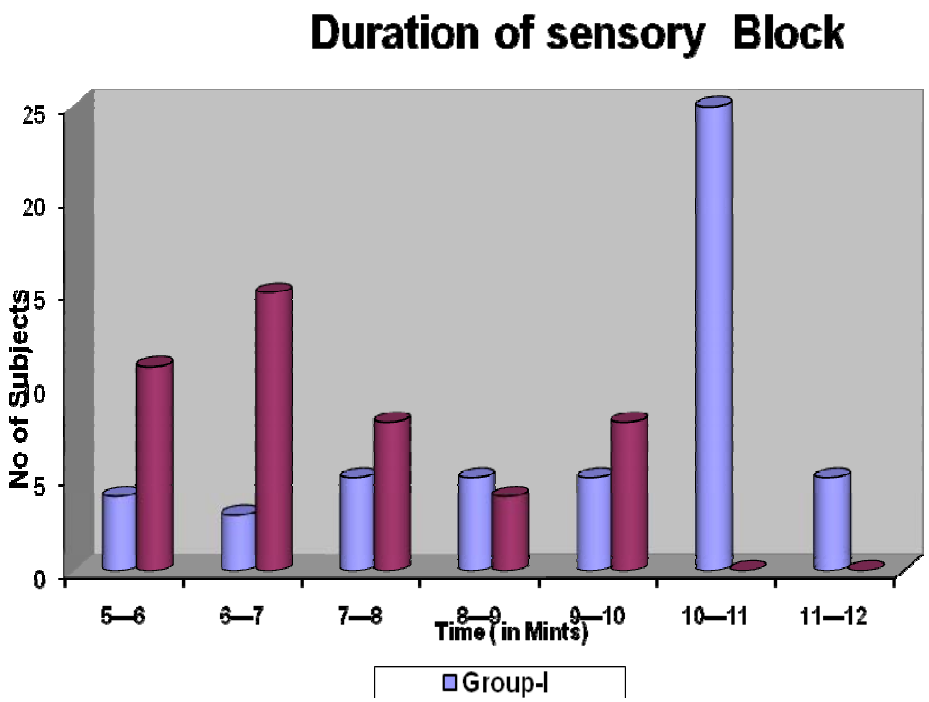
No motor blockade- 12.3% No motor blockade- 13.30%

Since the chisquare test value is 0.58,there is no statistically significant variation in both groups regarding degree of blockade.

Post operative analgesia:

Table-10: Duration of Sensory Block

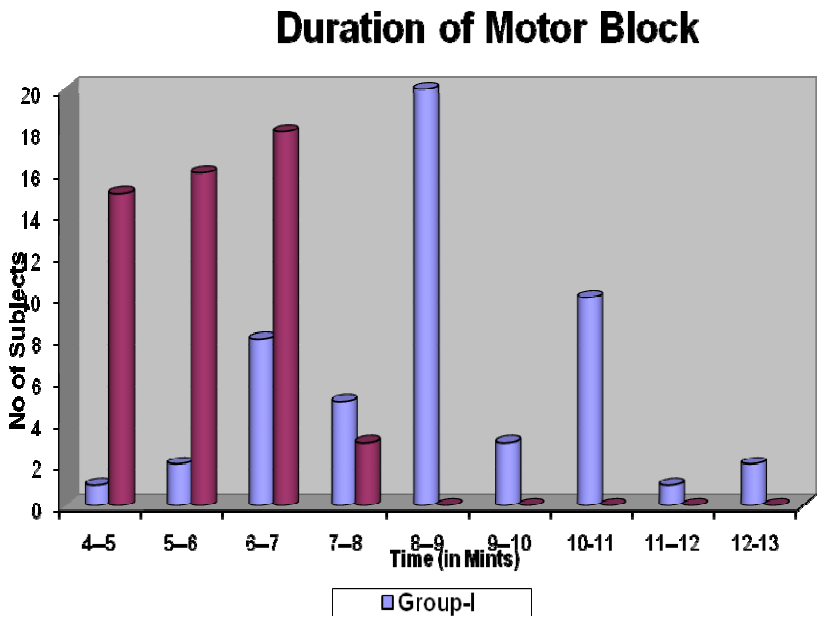
Time (in Hours)	Group-ONE (52)		Group-TWO (51)	
	Number	Percentage	Number	Percentage
5—6	4	7.70	12	21.60
6—7	3	5.80	15	29.40
7—8	5	9.60	10	15.70
8—9	5	9.60	05	07.70
9—10	5	9.60	08	15.70
10—11	25	57.70	0	0
11—12	05	09.60	0	0
Mean ± sd	10.93 ± 3.78		7.03 ± 1.21	
t-value	7.09			
Df	102			
p-value	0.0001 (Significant)			



In group ONE, The average time that post operative pain relief after the surgery was around 10.93 hours. The time ranged from 5 to 12hours. While in group TWO mean duration of pain relief was 7.03 hours. So the new technique will clearly provide long duration of pain relief.

Table-11: Duration of Motor Block

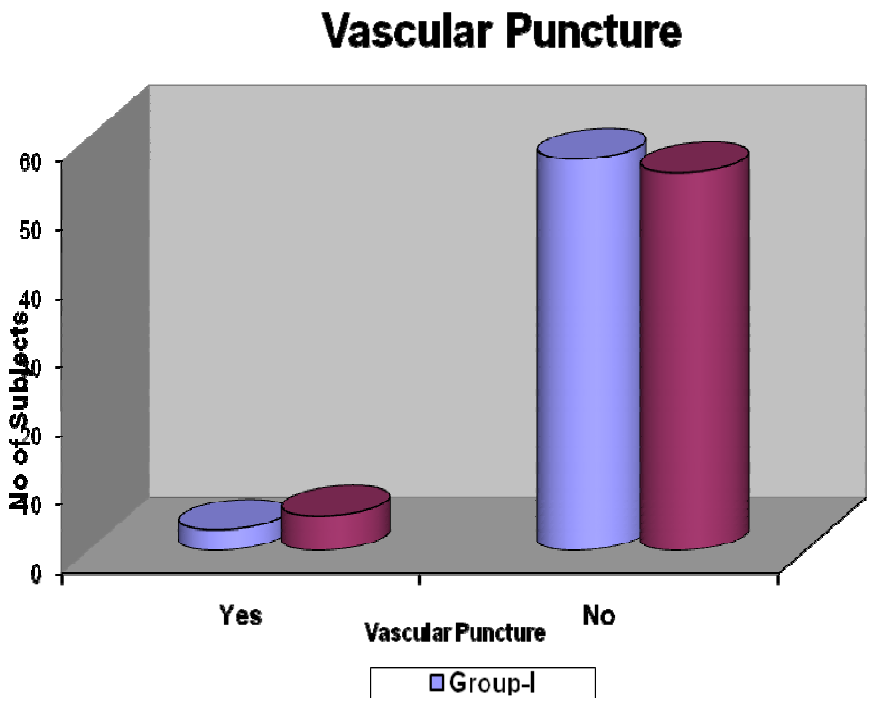
Time (in Hours)	Group-ONE (52)		Group-TWO (51)	
	Number	Percentage	Number	Percentage
4--5	1	1.90	15	28.20
5--6	2	3.80	16	30.80
6--7	8	15.40	17	34.60
7--8	5	9.60	3	5.80
8--9	20	38.50	0	0
9--10	3	5.80	0	0
10-11	10	19.20	0	0
11--12	1	1.90	0	0
12 - 13	2	3.80	0	0
Mean ± sd	8.01 ± 2.16		5.74 ± 1.03	
t-value	6.89			
Df	102			
p-value	0.0001 (Significant)			



The **mean duration of motor blockade** was 8 hours in newer technique (group ONE) while in classic technique (group TWO) it is 5.74 hours. This is statistically significant with long duration of block, which is helpful for surgery of long duration.

Table-12 : Vascular puncture

Vascular Puncture	Group-ONE (60)		Group-TWO(60)	
	Number	Percentage	Number	Percentage
Yes	3	5.00	5	8.30
No	57	95.00	55	91.70
Total	60	100	60	100



The incidence of **vascular puncture** in newer technique (group A) was in 3 cases, while in classic study (group B) it was 5 cases. There is no statistically significant difference between the two groups.

DISCUSSION

In my study, a regional technique- sciatic and femoral nerve were blocked through anterior approaches by a single needle vs two needles and peripheral nerve stimulator for below knee surgeries. It is a safe technique; causes no disturbance to milieu interior[3]. In my study sciatic and femoral nerve block was performed with patient in supine position, through a single point of entry and compared with classical two needle technique.

The land marks were drawn at an average time of 1.5 minutes. The **mean time to perform the block** was 6.35 minutes in group ONE and 14.9 minutes in group TWO. The performance time was shorter in new single needle technique, with statistically significant difference. So newer technique has advantage of short performance time. In Pierre pandin[3]Et al study done for single needle approach, the performance time 4.2 minutes.

The average time for **onset of femoral sensory block** was 11.53 min in new group while in classical technique it was 8.74 minutes. The classical approach is clearly having advantage in onset of femoral

sensory block. In Pierre pandin[3] et al where the mean onset of femoral sensory block was 15.4 minutes, correlating to my study.

The **onset of sciatic sensory nerve block** in new single needle technique was 21.91 minutes while in classic technique was 29.23 minutes. The newer technique has statistically significant difference with short onset of time.

The mean **onset of motor blockade** in new technique was 25.58 minutes while in classic technique was 31.57 minutes. Even though it is not a statistically significant difference, but newer technique has early onset in comparison to classical technique. This can be compared with the original study by Pierre pandin[3] et al in which onset of motor blockade was 28.6 minutes.

Degree of motor blockade

Failure of 8 cases in new technique and 9 cases in classic technique were noted. In both study the failure of femoral block was in 3 cases, while failure of sciatic block was 5 in newer and 6 in classic study. There was no statistically significant difference regarding degree of motor blockade between the two groups. In newer technique, the success of femoral nerve block was 95% and sciatic was 91.7%.

The success rate of combined sciatic and femoral block in my study was 91.7% and 95%. This is similar to that of the study conducted by Pierre Pandin [3]et al in 119 patients. In his study, the success of femoral nerve block was 90% and sciatic nerve block was 95%.

Fuzier[13] R, et al conducted a comparative study in 60 patients in emergency lower limb surgeries. He concluded that the success rate of both the anterior (80%) and lateral approach (85%) of the sciatic nerve blockade was the same. In my study the success rate of sciatic nerve block was 91.7%.

In newer technique group, **the mean duration of post operative analgesia** lasted for 10.93 hours, while in classic technique it was 7.02 hours. The difference between two groups were statistically significant with prolonged period of analgesia in newer technique. In our hospital inj.Tramadol was given as rescue analgesia when VAS score was more than 5. In Pierre Pandin[3] et al, the post mean duration of post operative analgesia lasted for 10.6 hours, which is correlating to our study.

The **mean duration of motor blockade** was 8 hours in newer technique while in classic technique it is 5.74 hours. This is statistically significant with long duration of block, which is helpful for surgery of long duration . In Pierre pandin [3]et al the duration of motor blockade was 8.2 hours, our study correlating to the original study by Pierre pandin.

The incidence of **vascular puncture** in newer technique was in 3 cases, while in classic study it was 5 cases. There is no statistically significant difference between the two groups.

This is the only alternative technique to neuraxial blockade in supine position in case of absolute or relative contraindications.

The technique has many advantages, such as easy identification of landmark, very low risk of vascular injury and lack of complications such as total spinal or epidural Anesthesia.

This technique allows the patient to be placed in supine position which over comes the disadvantage of shifting and positioning in trauma patients with fracture of lower limb. This technique can also be used in patients with reduced cardio pulmonary reserve. The other advantages of this technique are short procedure time, early onset sciatic nerve sensory block, prolonged duration of motor blockade, prolonged sensory blockade with good post operative pain relief compared to the classic two needle technique.

SUMMARY

This randomised prospective study was done on 120 patients satisfying the inclusion criteria and undergoing surgeries below knee surgery. They were assigned into two groups, Group ONE and Group TWO. Of which, 60 patients received newer single needle technique for combined femoral and sciatic nerve block through anterior approach using nerve locator in group ONE, and other 60 patients received classical two needle technique block for combined femoral and sciatic block through anterior approach using nerve locator in Group TWO.

The complete sensory block at the end of 40 minutes was seen in 52 patients of Group ONE and 51 patients of Group TWO.8 patients in Group ONE and 9 patients in Group TWO were excluded from the study due to lack of complete sensory block at end of 40 minutes.

Parameters observed were the performance time, onset of femoral sensory block, onset of sciatic sensory block, onset of motor block, duration of motor block, duration of post-op analgesia (duration of sensory block), and block related complications like haematoma formation , vessel puncture and nerve injury

The study shows that:

1. Procedure time was shorter in Group ONE compared to Group TWO.

2. Onset of femoral sensory block was earlier in Group TWO compared to Group ONE.

3. Onset of sciatic sensory block was earlier in Group ONE compared to Group TWO.

4. Even though the Onset of motor block was earlier in Group ONE compared to Group TWO, it was not statistically significant.

5. Degree of motor blockade was similar in both groups.

6. Duration of motor block was longer in Group ONE compared to Group TWO.

7. Duration of post – operative analgesia was longer in Group ONE compared to Group TWO.

8. Complications- there were no significant complications like accidental vascular puncture, anaphylaxis or toxicity.

CONCLUSION

In my study, it is found that the newer anterior approach using single skin needle technique for performing sciatic and femoral nerve blocks is easy and reliable. It is an alternative to subarachnoid block for below knee surgeries, especially in patients with trauma and in patients with reduced cardio pulmonary reserve. It has the advantage of short procedure time, prolonged sensory and motor blockade with good post operative pain relief compared to classic two needle technique.

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PROFORMA

Patient name: Age: Sex: Weight:

IP No: Date: Ward: Group:

Co morbid Condition: ASA: MPC:

Surgical Procedure: Duration:

Pre Block Parameter:

PR- BP- SpO2- RR-

Anaesthetic Procedure:

Concentration and Volume of Drug used:

S.No.	**Characteristics of block**:	
1.	Performance time (minutes)	
2.	Onset time for sensory - femoral nerve (minutes)	
3.	Onset time for sensory - sciatic block (minutes)	
4.	Onset time for Motor block (Minutes)	
5.	Degree of motor blockade - 0, 1, 2	
6.	Duration of sensory block (hours) - Time for giving rescue Analgesia	
7.	Duration of motor block (hours)	

Complications:

1.	Accidental vascular puncture
2.	Haematoma formation
3.	Nerve injury
4.	Anaphylaxis
5.	Local Anaesthetic toxicity
6.	Infection at the haematoma site
7.	Delayed neurological deficit

INTRA OPERATIVE MONITORING:

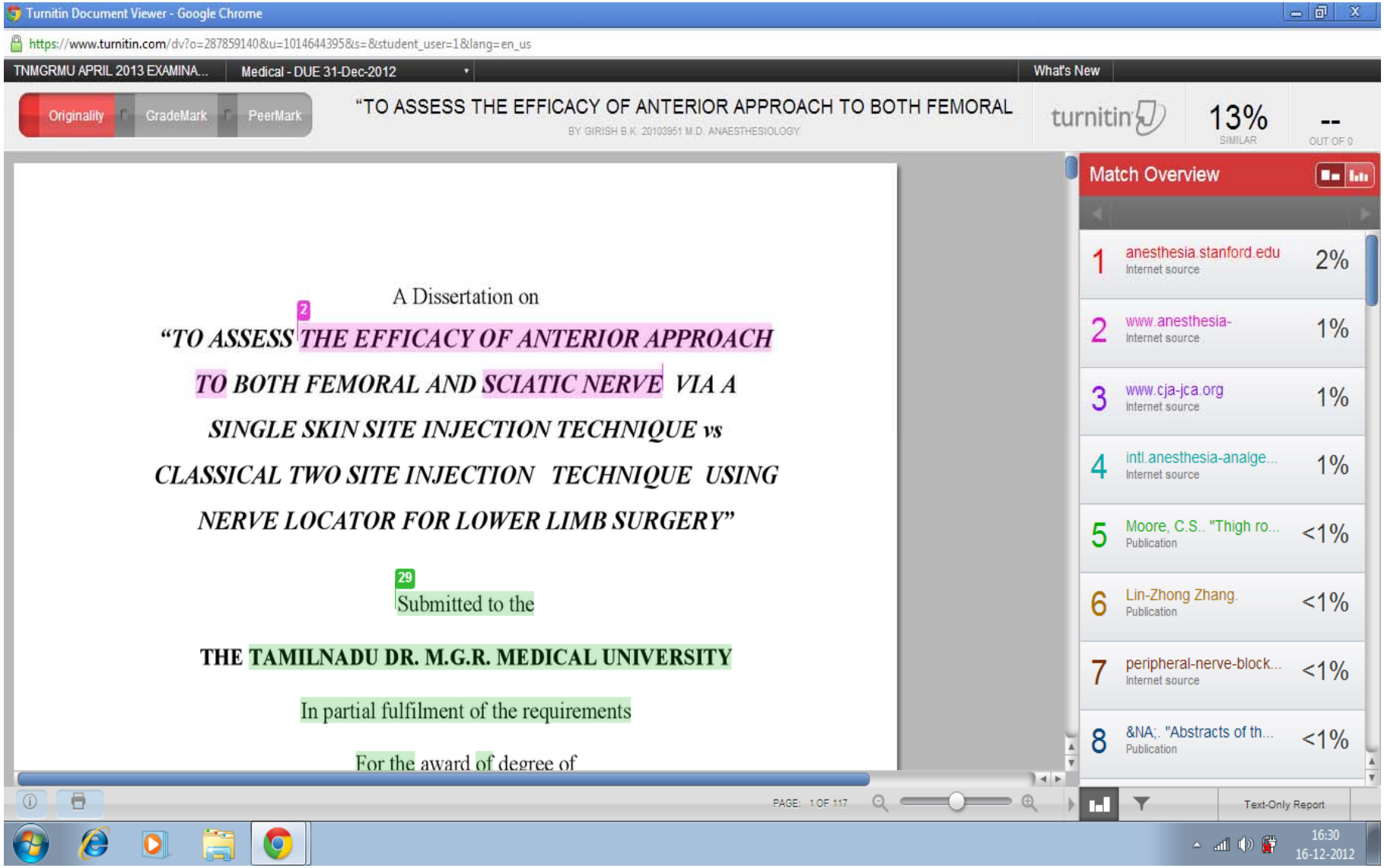
TIME SINCE PROCEDURE	SYSTOLICBLOOD PRESSURE	DIASTOLICBLOOD PRESSURE	HEARTRATE	SPO2	RESPIRATORY RATE
5 MINUTES					
10 MINUTES					
15 MINUTES					
30 MINUTES					
45 MINUTES					
1 HOUR					
1 HOUR 30 MINUTES					
2 HOUR					
2 HOUR 30 MINUTES					
3 HOUR					
3 HOUR 30 MINUTES					

POSTOPERATIVE MONITORING IN WARD:

TIME SINCE PATIENT RECEIVED IN WARD (HOURS)	SYSTOLICBLOOD PRESSURE	DIASTOLICBLOOD PRESSURE	HEARTRATE	SPO2	RESPIRATORY RATE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

REMARKS:

ANAESTHESIOLOGIST SIGNATURE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